OCTOBER 1946—FIFTY-THIRD YEAR

MACHINERY

48 years of LEADERSHIP

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ULTRA SUPER-PRECISION
M-R-C
Ultra Super-Precision
BALL BEARING
MADE IN U.S.A.
This bearing is extremely accurately made and dimensions held to exceptionally close tolerances. Caution: Do not break seal until ready to install and do not remove lubricant
KEEP THIS BEARING DRY AND CLEAN

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"And there's your answer, Jim"

In a few minutes, this threading operation will be cutting production costs by increased performance . . . .

The scene below is taking place every day in plants all over the country.

The man on the right is the "Greenfield Man"—a trained field engineer with the "know-how" to get the right answer to a threading problem, and the "show-how" to pass along this information so it can be put into practical use.

Is your plant making full use of "The Greenfield Man" in your territory? *If not, and if you have a threading problem, call the "Greenfield" Man through your "Greenfield" distributor today!*

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GREENFIELD TAP and DIE CORPORATION

GREENFIELD, MASSACHUSETTS

Design, Construction, Operation of Metal-Working and Allied Equipment

MACHINERY

VOLUME 53 — OCTOBER, 1946 — NUMBER 2

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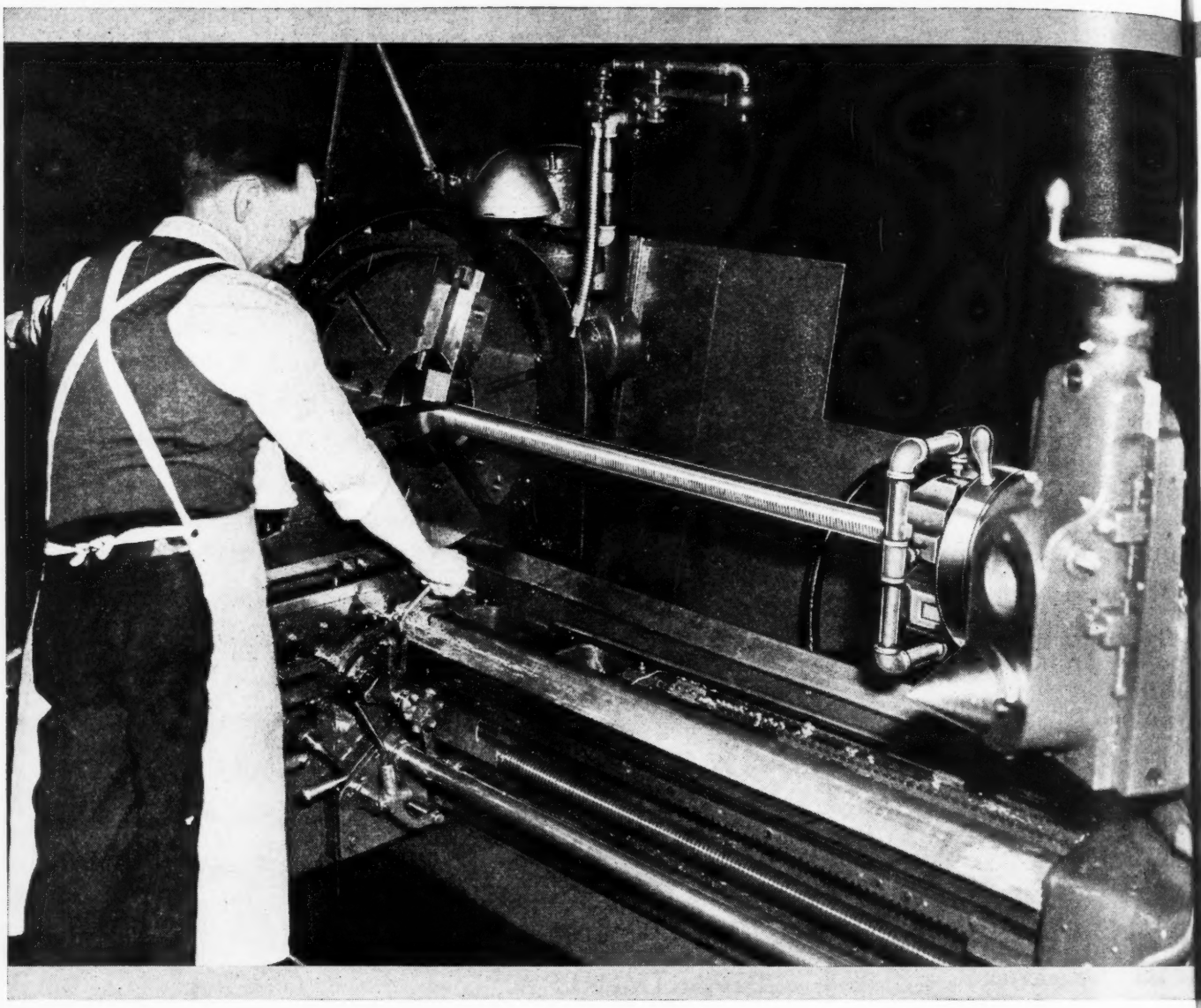

"Only one cut is taken in forming the thread from the blank tube. This results in a tremendous saving in time over the former practice of chasing and grinding the threads, grinding being no longer necessary because of the accurate performance of the die head chasers," writes the manufacturer.

Illustrations show a 3" LANDMATIC Die Head used by a Western aircraft company to thread long Wing-Flap Retracting Screws to extremely close tolerances. An Acme thread of 2" diameter, 4 threads per inch, is being cut to a length of 45½" on heat treated alloy steel tube 48" in length.

Thread lead and pitch diameter are held within aircraft tolerances. Concentricity of thread with the O.D. of tubing and smooth finish is assured by the use of Landis tangential type centering throat and roughing and finishing form chasers. Centering throat section of the chasers takes a bearing on the O.D. of the tubing, eliminating an out of round condition that often exists when long work pieces are being threaded.

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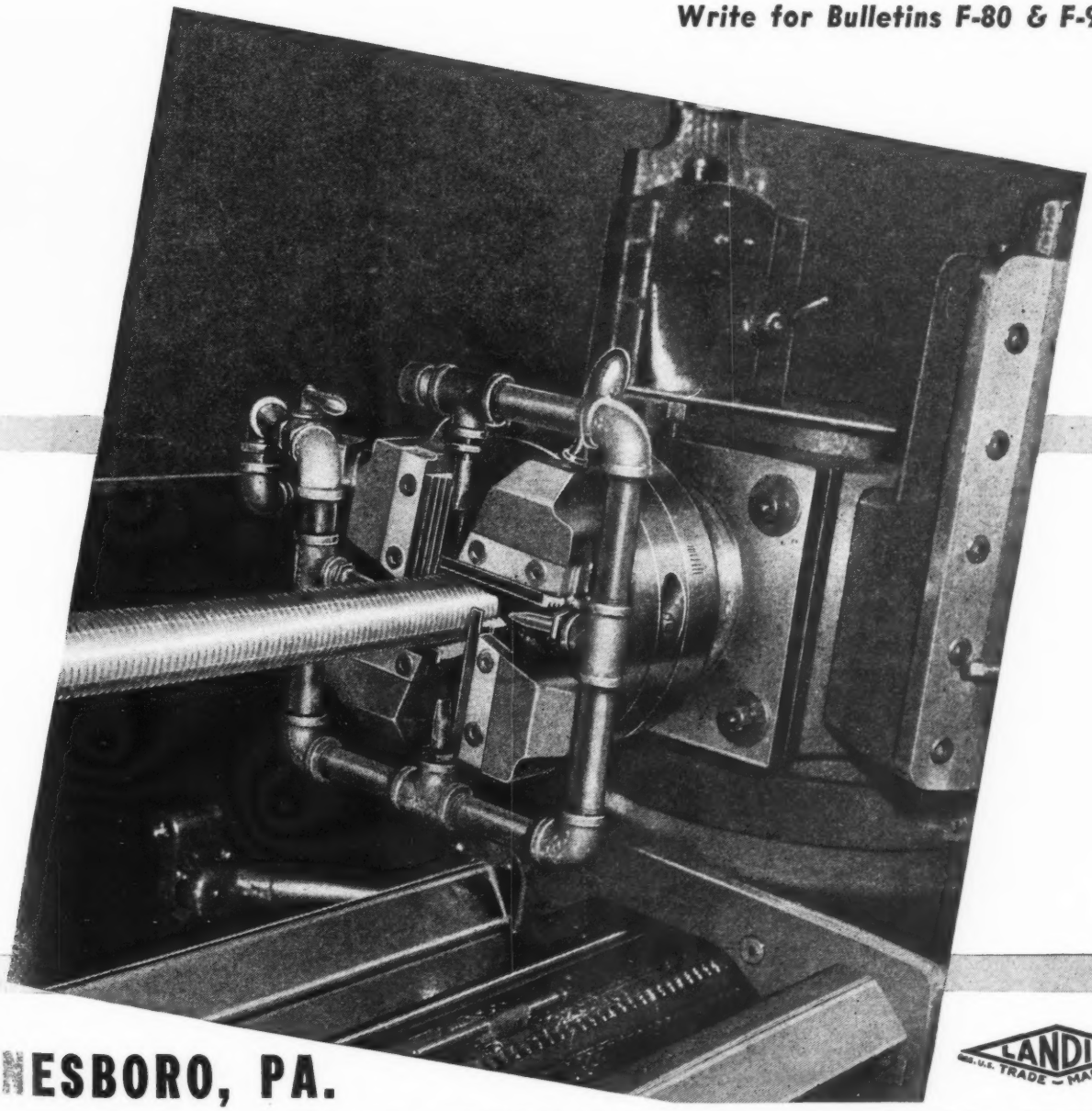
for Turret Lathe and Hand Screw Machine Threading Operations

Write for Bulletins F-80 & F-90



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Fellows LS-Type Gear Lapping Machines handle external or internal spur and helical gears. Lapping time is automatically controlled assuring consistent and uniform results on a high production basis.

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Write: The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Bldg., Detroit—or 1040 West Town Office Bldg., Chicago.

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you wouldn't

~~hunt elephants with~~

~~a "BB" gun~~

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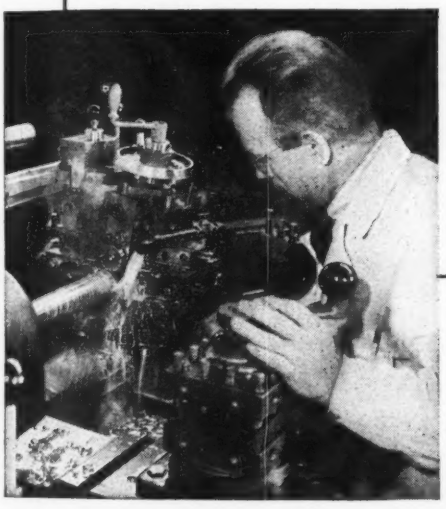
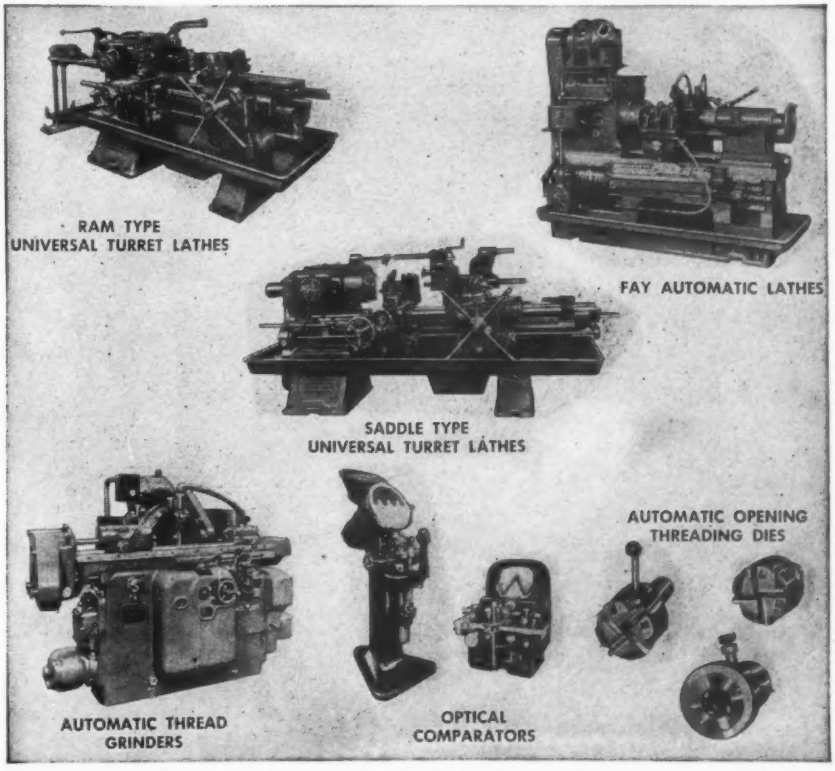
Telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



What HORSEPOWER Are You Using?

15 horsepower is required to take this 1/8" depth of cut on steel forging at 1000 RPM and .022" feed, with a carbide cutting tool, but carbide halves the cutting time.

Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools



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JONES & LAMSON

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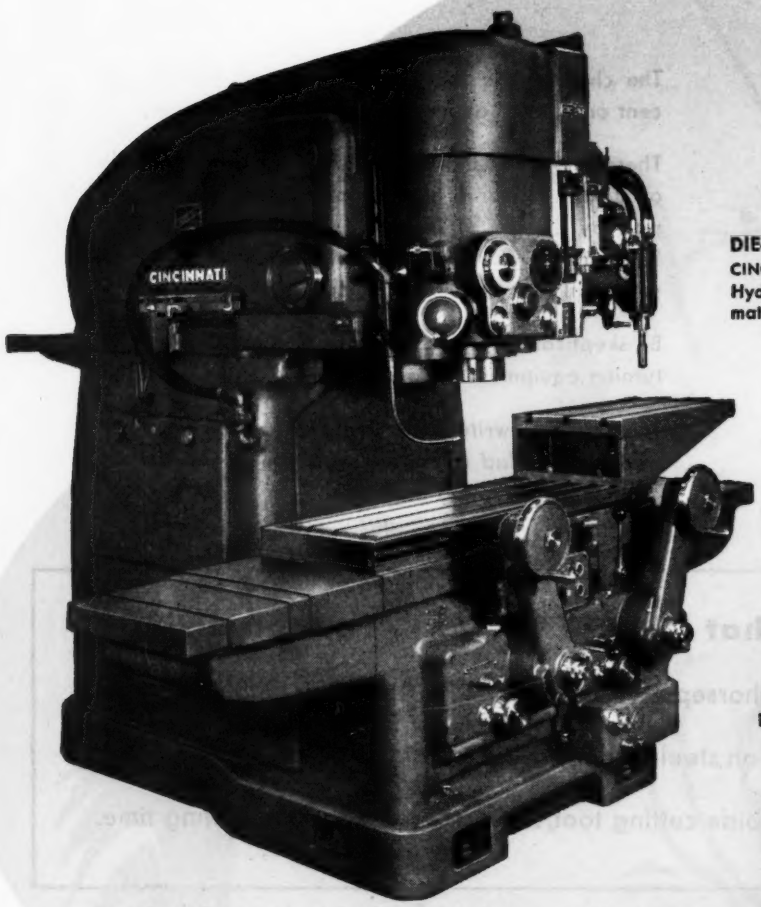
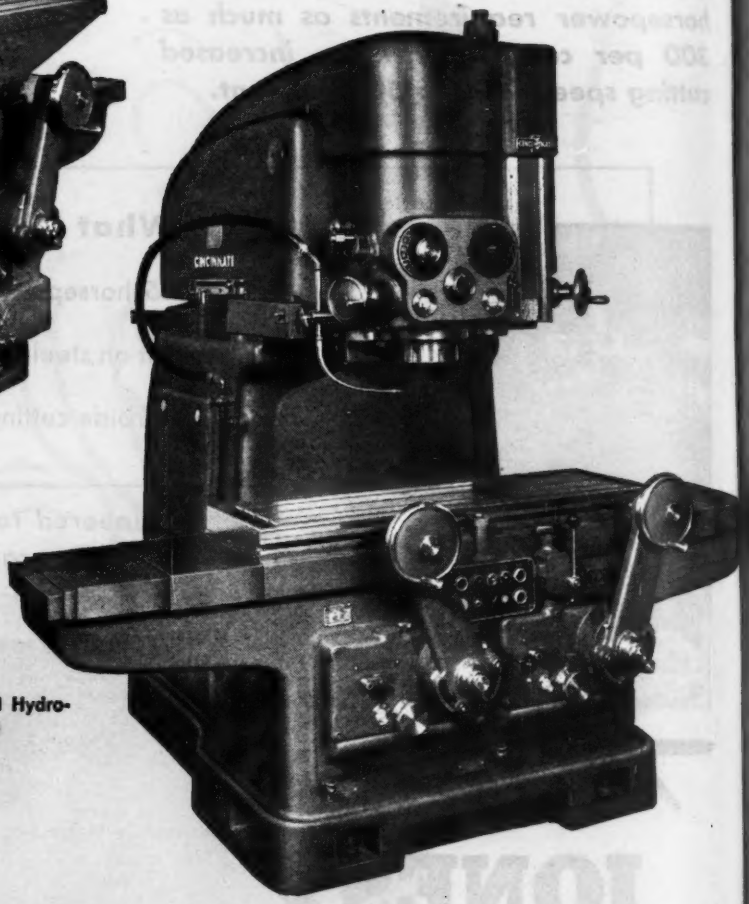


DIE-SINKING
CINCINNATI 16" Series Vertical Hydro-Tel Die-Sinker with Automatic Depth Control Unit



GENERAL PURPOSE MILLING
CINCINNATI 16" Series Vertical Hydro-Tel for general purpose milling

THE CINCINNATI

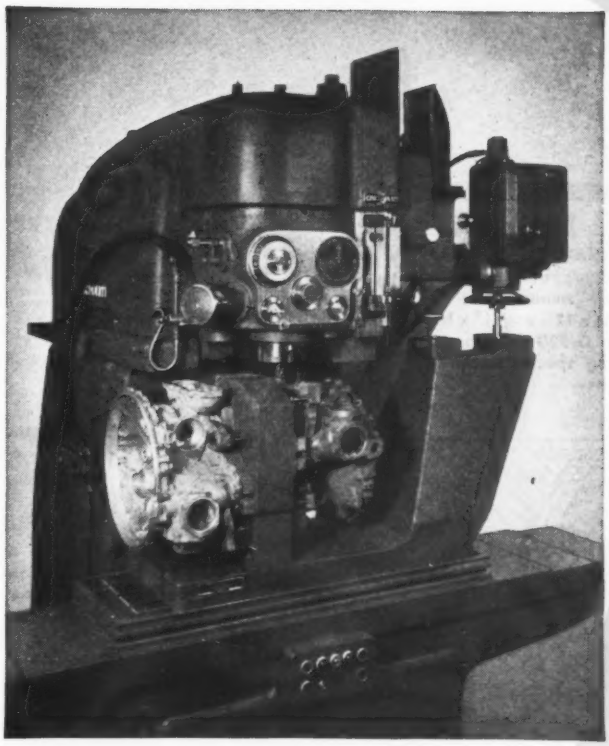
MILLING MACHINES

TO CINCINNATI'S LINE OF MILLING MACHINES

The 16" Vertical Hydro-Tel

IN 3 STYLES

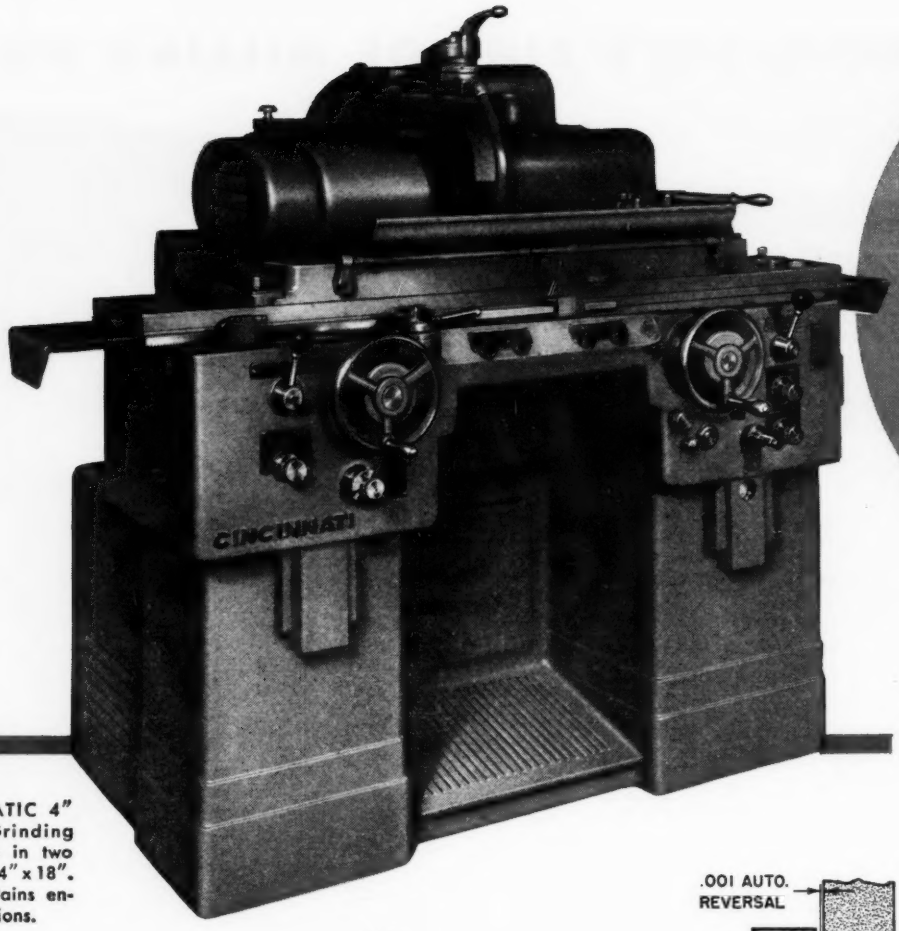
● The CINCINNATI 16" series Vertical Hydro-Tel Milling Machine, a recent addition to Cincinnati's complete line of milling machines, is built in three styles: 1) general purpose milling machine; 2) die-sinking machine; 3) automatic 360° profiling machine. It offers many features which effect production economies on a wide range of vertical milling operations. To mention a few of the features: centralized controls; sixteen spindle speeds; quick change adapter for spindle nose; automatically lubricated ways; fixed height table, and others that are equally important. ¶ It will pay you to investigate the new CINCINNATI 16" series Vertical Hydro-Tels for your vertical milling, die-sinking and profiling operations. Complete details on all features are contained in catalog M-1497. Write for your copy today! For a brief description of this machine, look in Sweet's Catalog File for Mechanical Industries.



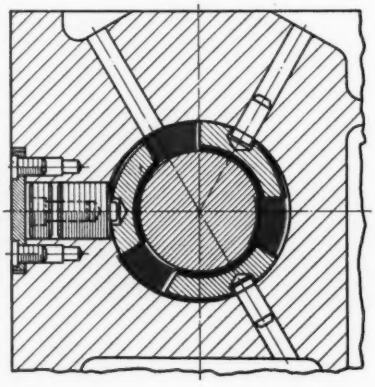
PROFILING
CINCINNATI 16" Series Vertical Hydro-Tel with 360° profiling equipment tooled up for milling a complex profile

MILLING MACHINE CO. CINCINNATI 9, OHIO, U.S.A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES



CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machine. Available in two sizes, 4" x 12" and 4" x 18". Catalog G-520 contains engineering specifications.



FILMATIC SPINDLE BEARINGS. Self-adjusting shoes produce independent, converging oil films which develop high radial pressures, forcing grinding wheel spindle into central position and keeping it there. No down time is ever charged against FILMATIC bearings.

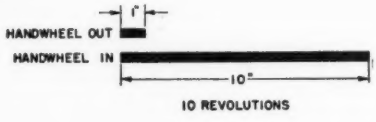
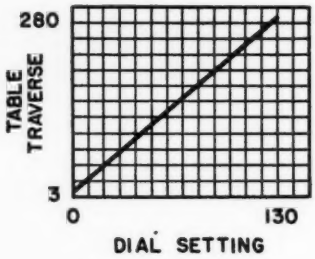
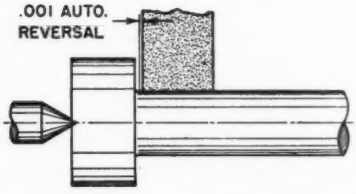


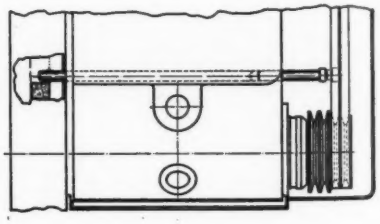
Chart above illustrates distance table travels in ten revolutions of handwheel. Slow speed for grinding shoulders; high speed for setting up is ten times faster.



Infinitely variable table traverse speeds — hydraulically powered, 3" to 280" per minute — the right speed for every job, including wheel truing.



Accurate table reversal within .001", an important feature when grinding next to shoulders; reduces spoilage.



Two-speed grinding wheel drive has double diameter V-belt sheaves to provide increased wheel speed for worn wheels; increases wheel life.

CINCINNATI

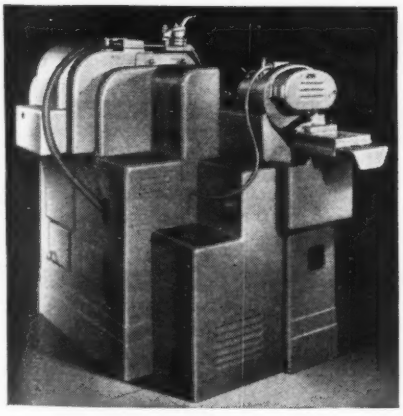
CENTER TYPE GRINDING MACHINES

7 FEATURES

that lower costs

OF GRINDING SMALL PRECISION WORK

● It takes a lot of figuring with a sharp pencil to reduce the cost of producing small precision ground parts, but it can be done, and perhaps at just as big a saving as the larger and more expensive parts. The illustrations on these pages will help you. They show several ways in which CINCINNATI FILMATIC 4" Plain Hydraulic Grinders lower the cost of grinding small precision work. In addition to these features there are other advantages such as: Independent Table Traverse Rate for truing the wheel; Exceptionally Accurate Sizing, adjustments in increments as small as .0001" on work diameters; Single Lever Control for table traverse, work rotation, and coolant; Dog Controlled Table Reciprocation from 1/16" to full stroke; Finger-tip Positive Stop for Cross Feed Handwheel; Rapid and Visible Pick Feed Adjustment, and many other features which combine to give you fast, accurate, low cost production for your small parts. Engineering data may be obtained by writing for catalog G-520. A brief description of this machine will be found in Sweet's Catalog File.



Left: Ample and effective coolant guards are shown in this rear view of the machine. Motors are protected from dust and moisture, minimizing electrical maintenance.

Right: Kneehole in the new FILMATIC 4" Plain Hydraulic permits operation of the machine while the operator is seated comfortably on a chair or stool.

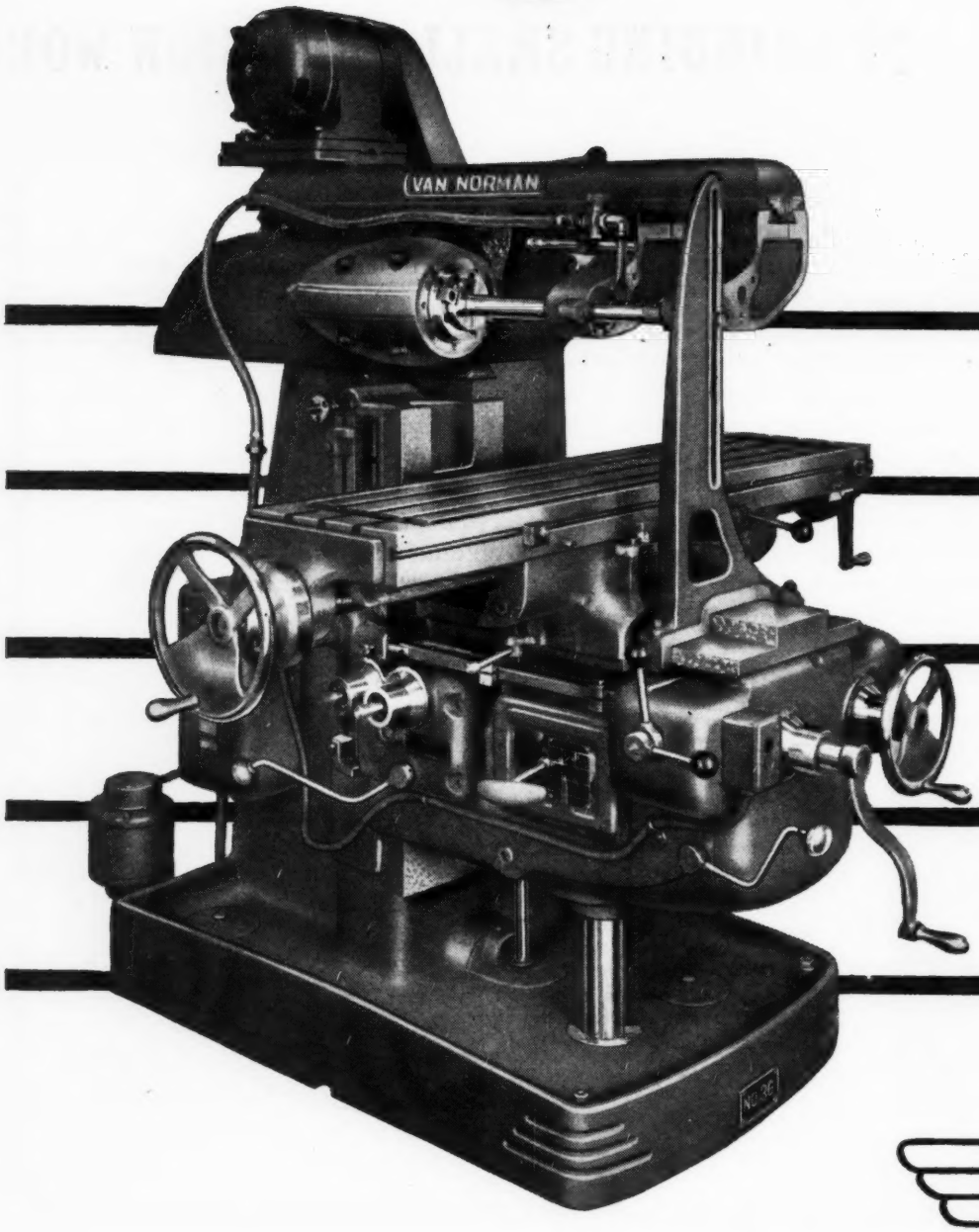
GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

5 REASONS W

...with Van Norman Ran



No. 36 With adjustable cutterhead mounted in horizontal milling position.

"It Pays to Van Normanize"

S WHY YOU PROFIT

an Ram Type Milling Machines

Adjustable Cutterhead permits you to perform horizontal, angular or vertical milling all on one machine . . . minimizes work setups . . . cuts idle operator and machine time up to 50%. In addition, this versatility enables you to meet daily job to job milling requirements.

Increased Range—the adjustable cutterhead and movable ram provide maximum milling capacity and versatility.

Front and Rear Finger-tip Controls of all power feeds, six way rapid traverse and hand adjustments provide extreme ease of control . . . reduce work fatigue . . . improve accuracy. Power controls operate in the desired table, saddle and knee movement assuring maximum simplicity of operation.

Single Lever Feed Selector provides quick, easy selection of the proper feed for the type of work being milled. 18 feeds are instantly available from front or rear operating positions.

Long Life Accuracy is assured by the precision rigid Van Norman construction. Hardened alloy steel gears and multi-splined shafts operate on anti-friction bearings . . . automatic lubrication assures thorough oiling of all moving parts . . . massive knee, saddle and table assemblies provide rigidity.

Investigate Van Norman Ram Type Millers today. They are available in many models and sizes, with plain or universal saddles, to meet every requirement for toolroom, laboratory, machine shop, pattern shop and general purpose milling.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

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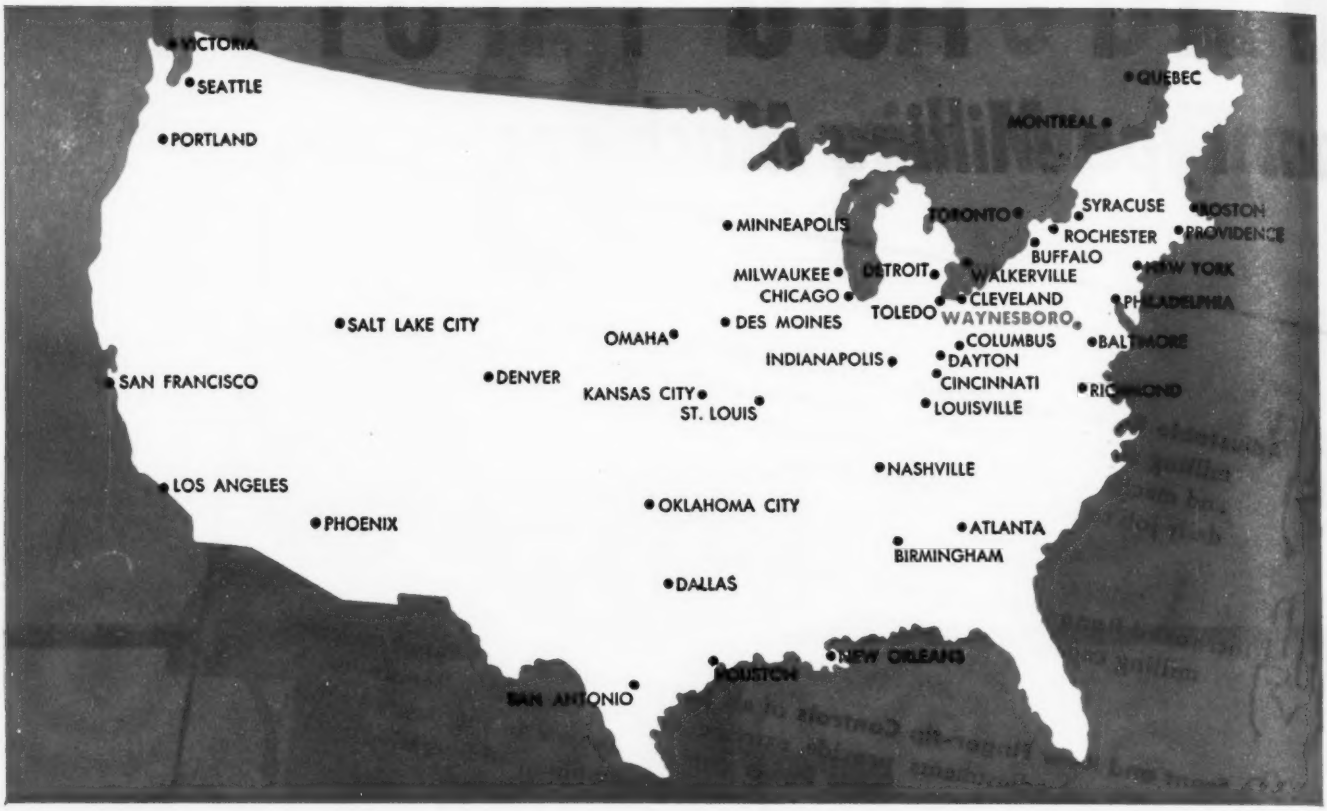

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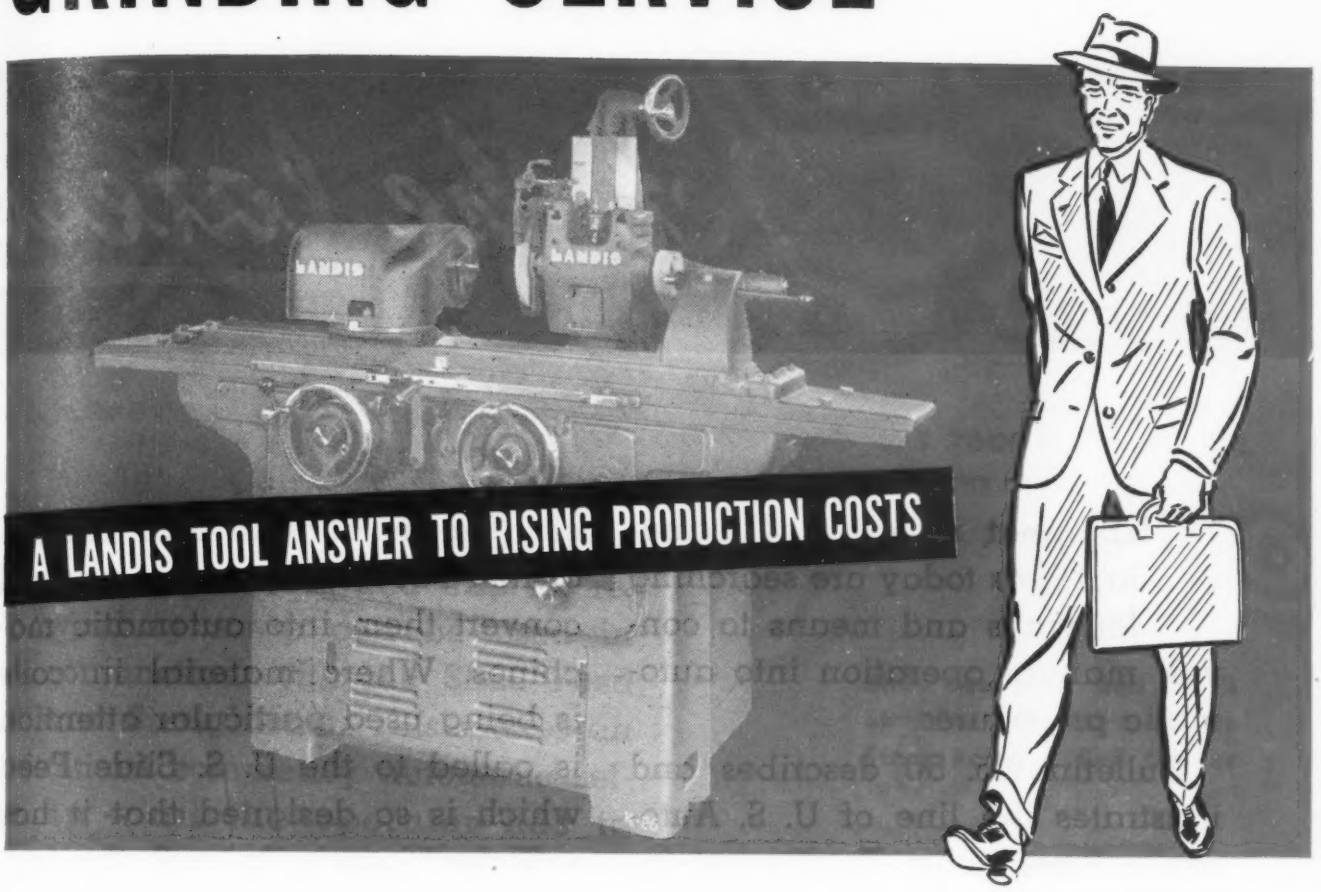
Precision Grinders

LANDIS TOOL COMPANY

GRINDING SERVICE"



WHATEVER THE GRINDING JOB—Plain Cylindrical, Taper, External, Thread, Internal, Tool Grinding, Crankshaft, Cam Shaft, Crankshaft Regrinding, Valves, Bearing Races and Roll Grinding.

WHATEVER THE GRINDING PROBLEM—High Production, Automatic Sizing, Fine Finish, Formed Wheel Grinding, Grinding in Two Planes, Special Work Holding Fixtures, Cost Reduction.

Rising production costs are a tough problem. But if you have a difficult grinding problem or a production job that can be done by grinding, it will pay you to consult Landis Tool for engineered grinding service.

You will get the simplest and lowest cost solution to your problem from specialists in grinding. The standard line of over 150 types and kinds of grinders are at the disposal of the Landis Tool grinding engineer to help solve your problem. For simple between centers cylindrical work it may require a plain machine. Greater flexibility may make a universal grinder desirable. The following may be needed for special production requirements: Centerless grinder, centerless thread grinder, angle wheel base, rapid infeed, special work holding fixtures.

In addition you have the assurance that your Landis Tool precision grinder will have all the finest and latest features that give high production to close tolerances with a fine finish. For help on your grinding problem, consult your nearest Landis Tool representative or write direct. 47

WAYNESBORO, PENNA.

CENTERLESS GRINDERS TOO, BY LANDIS TOOL...OF OUTSTANDING NEW DESIGN. WRITE FOR CATALOG T44

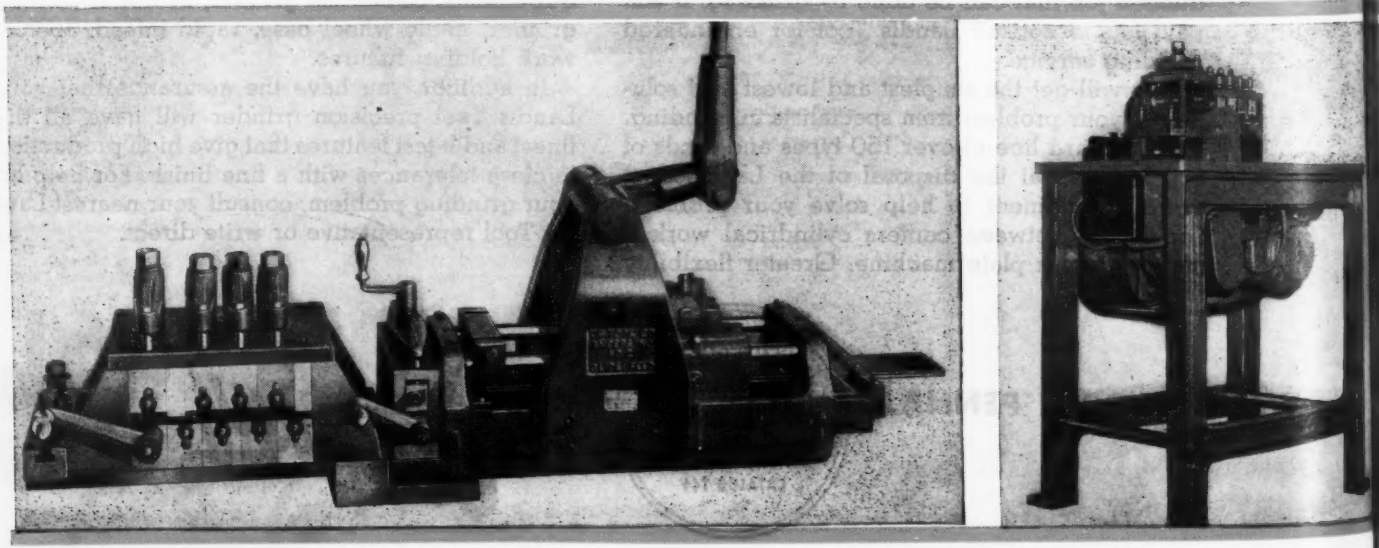
LANDIS TOOL *Company*

Get the latest fa

THE great majority of manufacturers today are searching for ways and means to convert manual operation into automatic procedures.

Bulletin No. 50 describes and illustrates the line of U. S. Automatic Press Room Equipment including Slide Feeds, Roll Feeds, Plain and Power Driven Stock Straighteners, Plain and Power Driven Stock Reels, Stock Oilers, etc. The installation of U. S. Slide or Roll Feeds on your presses will convert them into automatic machines. Where material in coils is being used particular attention is called to the U. S. Slide Feed which is so designed that it has sufficient power to pull the material through a plain stock straightener. A setup of this type is shown by the illustration below in the series of photos. Automatic

U. S. TOOL COMPANY, INC.



facts on

U.S. Automatic Press Room Equipment

U. S. TOOL COMPANY, INC.
Ampere (East Orange), N. J.

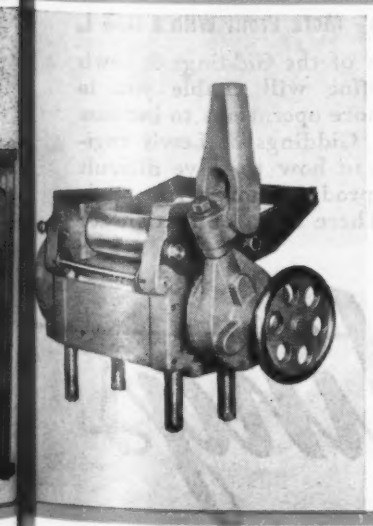
Bulletin No. 50

Slide Feeds — Roll Feeds
Straighteners—Oilers—Wipers
Stock Reels — Coil Cradles

Stock Reels for unwinding new coils of material and also for rewinding scrap can be used in conjunction with the Slide Feed and Straightener. This makes an almost completely automatic setup — all the operator has to do is load the Stock Reel with new coils of material when required.

For further details ask for a copy of Bulletin No. 50.

AMPERE, (East Orange), N. J.
Builders of U. S. Automatic Press Room Equipment, U. S. Die Sets and Accessories, U. S. Multi Slides, U. S. Multi Miller.



1. U. S. Slide Feed and Plain Stock Straightener ready for mounting on a Punch Press. The Slide Feeds and Straighteners are made in a range of sizes to handle various widths of material and to provide different feed lengths.

2. Power Driven Straightener designed for heavy duty operations and for the type of application where a slide feed and plain straightener cannot be used.

3. U. S. Roll Feed employed especially where material in short lengths is used. This type of feed also provides a most suitable method for feeding right to left as the drive can be taken from the left side of the press and the material pulled from right to left.

4. Automatic Stock Reel with motor and mercury switch control which maintains a loop in the material at all times thereby removing strain from the feeding mechanism. Made in a range of sizes to accommodate various widths of material and coil weights.

1 G. & L. MACHINE Completes

Over 75 Contour Milling . . . Drilling . . . Boring . . . Reaming . . . Tapping . . . Slotting and Back-facing Operations Are Quickly Performed as Casting Is Indexed on Trunnion Type Holding Fixture.

● Regardless of intricacy of the workpiece, an almost unlimited range of machining operations can be handled rapidly and accurately on a Giddings & Lewis horizontal boring machine. This unusual and irregular shaped machine component requiring numerous operations is an excellent example of a difficult part, completed on a *standard* G. & L.

More than 75 operations are performed as the part is placed in 9 different positions. A trunnion type holding fixture indexes the different angular surfaces so they are at right angles to the cutters. With this accomplished, it is a simple matter to extend the G. & L. machine spindle and cutting tool to hard-to-reach internal pads, bores, bosses and slides. Over-all machining time including work settings is approximately 33 to 35 hours. Allowable tolerances on most surfaces are plus or minus .001″ and bearing holes are held to .0005″.

Sequence of Operations in Different Work Positions

1st Position — Rough mill face and lineup bosses.

2nd Position — Bore 2 end holes. Open set-up.

3rd Position — Place on angle plate trunnion. Finish bottom face. Drill and back spot face 6 holes.

4th Position — Mill cover plate *(contour milling)*.
Mill cap boss—drill and tap 2 holes for cap.

5th Position — Turn end for end set on 35° angle fixture.
Face mill gear cover box.
Mill cored bearing surface—mill 2″ slot.
Mill 2⅜″ slots.
Drill 7 holes—back spot face 6.
Drill ¾″ hole.

6th Position — Locate on slotted bearing and mill edge—drill and tap 8 holes. Drill and ream 2 holes 65° off cover face.

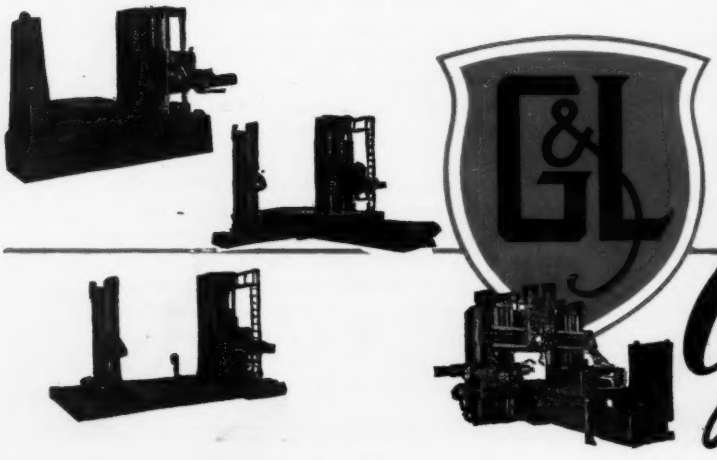
7th Position — Turn end from end.
Counterbore—5¼″ holes.
Bore—2-2.441″ bearing holes.
Bore—1.575″ hole.
Counterbore—2⅛″ hole.
Bore—1.850″ bearing hole.
Mill angular pad inside cover plate.

8th Position — Mill gear rack slide on inside 13/16″—¾″—⅛″—.375″ deep.

9th Position — Set on original locating surface and bore center bearing. Index 90° and bore internal bearing.

More Jobs - More Operations - More Profit With a G. & L.

Flexibility and versatility of the Giddings & Lewis Horizontal Boring Machine will enable you to perform more jobs and more operations to increase your machining profits. Giddings & Lewis engineers will gladly show you how to solve difficult machining problems and produce more with standard G. & L. machines. There is no obligation for this service.



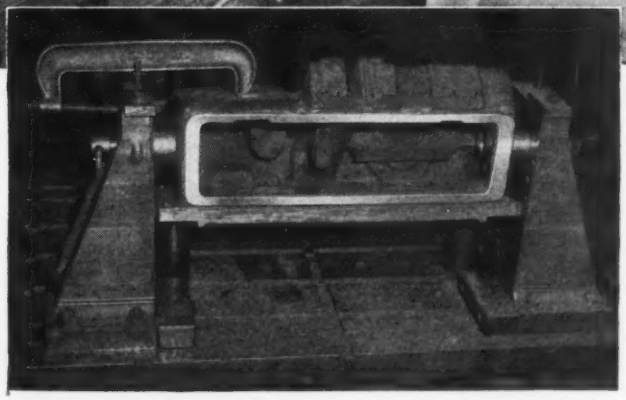
G&L

Giddings

all operations ON THIS COMPLICATED PART

Irregular shaped machine part showing a number of operations performed with the Giddings & Lewis machine.

Contour milling the cover plate of an intricate machine part. This operation is performed quickly and easily by using table and headstock feeds to move cutting tool as shown.



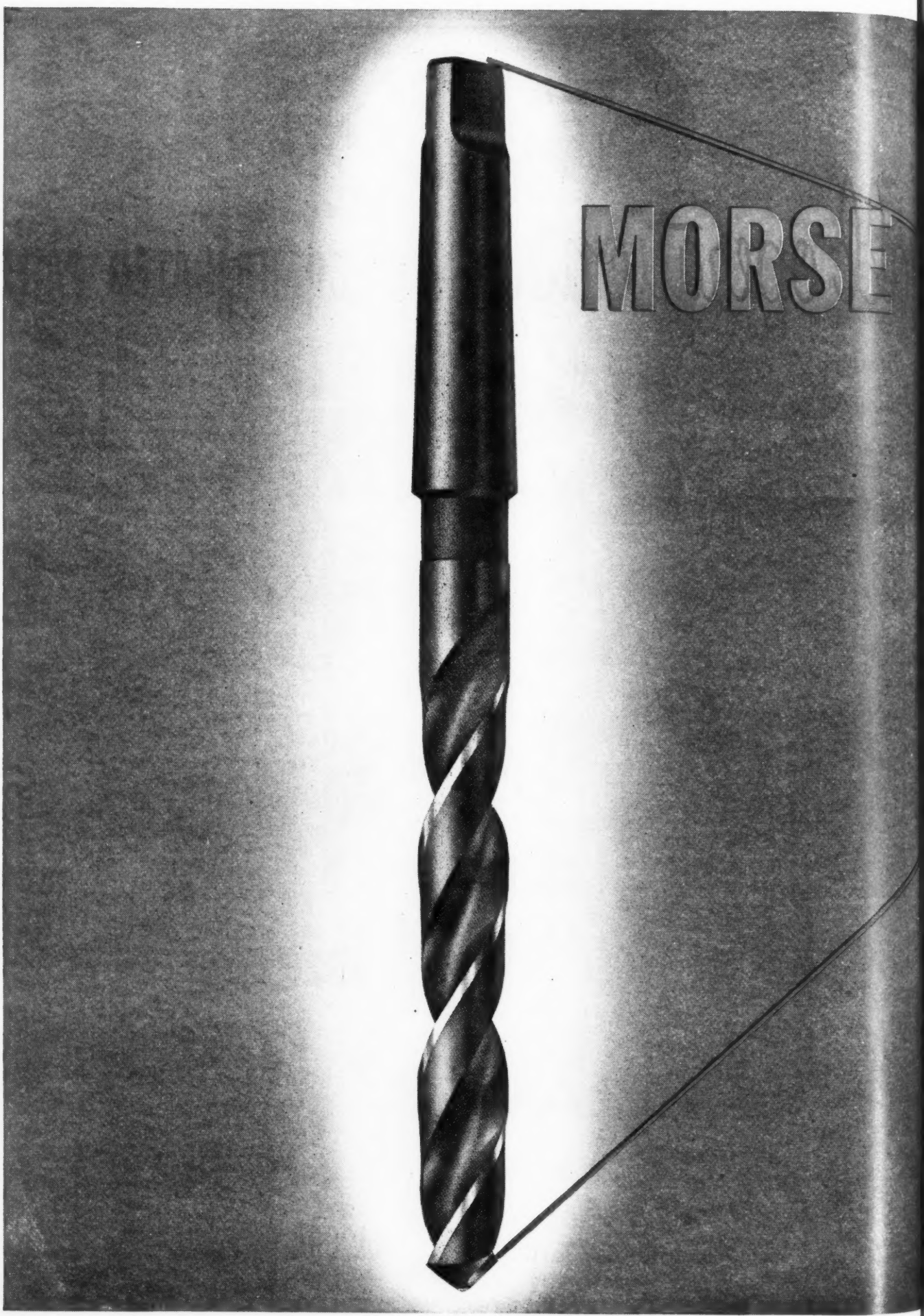
Simple trunnion type holding fixture that indexes angular surfaces correctly for different machining operations.

Helpful
FIELD PERFORMANCE DATA
Free!

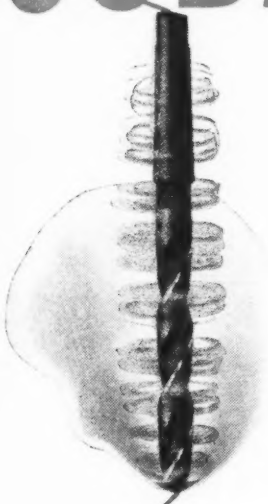
Write today for actual field stories showing how many difficult machining jobs are handled on Giddings & Lewis Horizontal Boring, Drilling and Milling Machines. In writing, ask for this valuable information as presented in the Production Data Folder M.A. 106.

Giddings & Lewis MACHINE TOOL CO.

140 DOTY STREET • FOND DU LAC, WISCONSIN


MORSE

COBALT DRILLS PERFORM



Where Standard High-Speed Steel Drills Fail!

ON THE *TOUGHEST* GOING . . . manganese, hard steels, castings, forgings, and other difficult to drill material . . . Morse *Cobalt* Drills out-perform standard high-speed drills.

What's more, Morse *Cobalt* Drills can be run about 25% *faster.* They hold their cutting edges far longer, too . . and they have the rigidity and strength to buck severe strains, when used in a rigid drill press with positive drive that will stand extreme point-pressure.

NOW . . . whether you drill tough steel, brass, plastics, or aluminum, always bear in mind that there is one Morse Drill of the right specification, length, diameter and twist-cut to do *your* job *best, at lowest cost.* And bear in mind, too, that with all these factors, it always saves you money to leave the complete specification up to us . . . through your distributor of Morse Twist Drills, Reamers, Taps, Dies, Milling Cutters, End Mills.

Accuracy, Quality, Uniformity: the MORSE Code of Cutting-Tool Manufacture

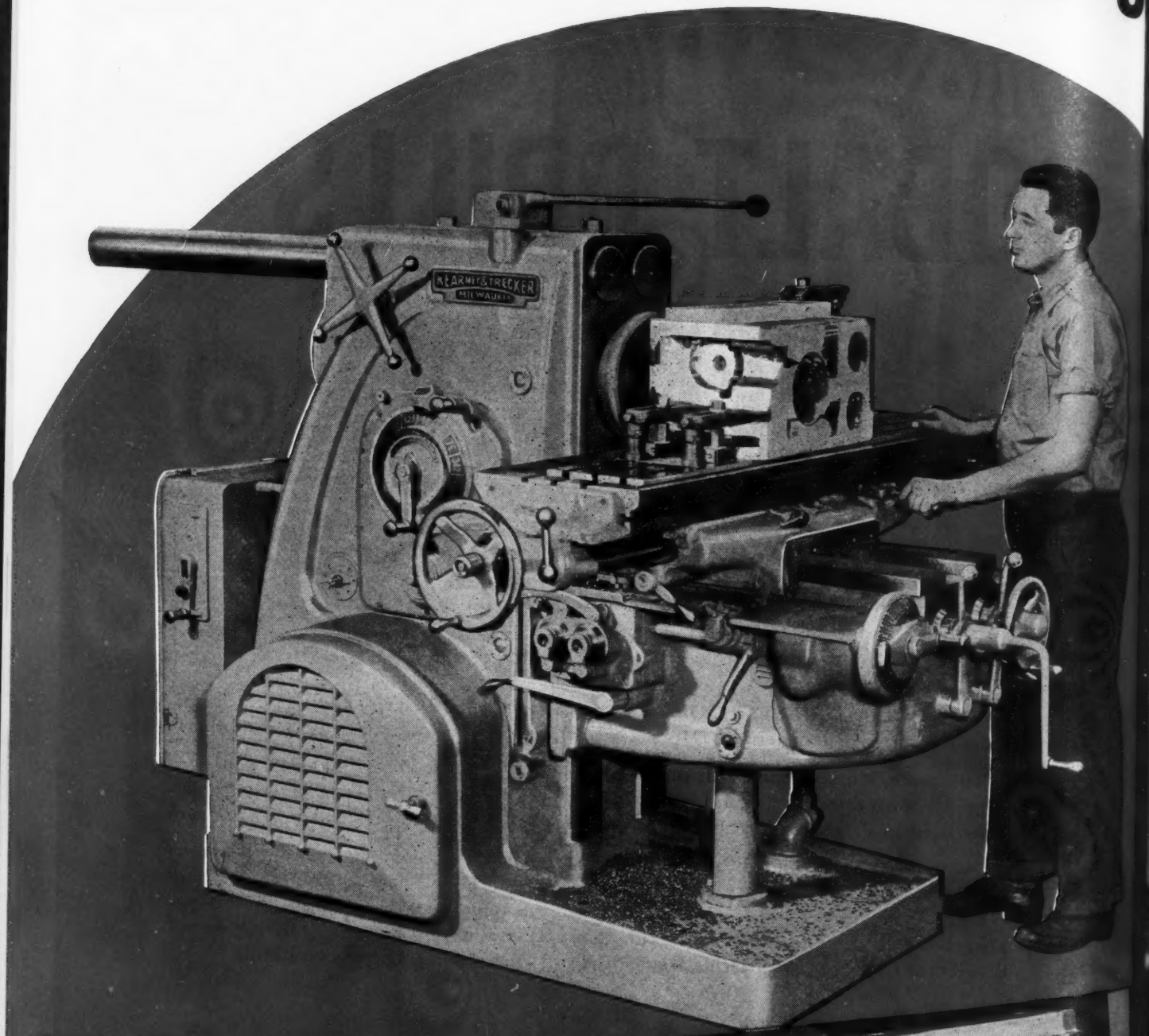
MORSE TWIST DRILL & MACHINE COMPANY

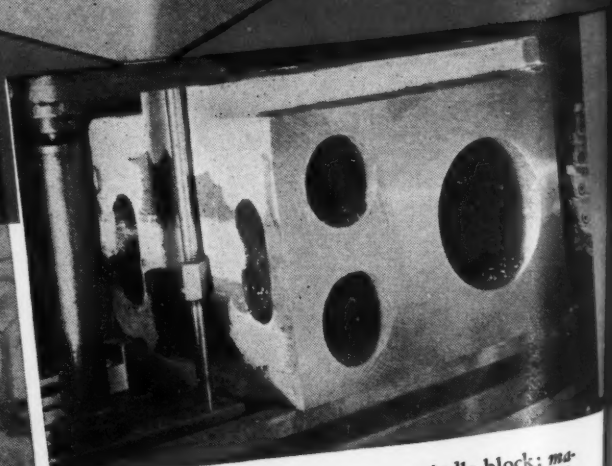
The Original Manufacturer of Twist Drills

NEW BEDFORD, MASSACHUSETTS

NEW YORK STORE: 130 LAFAYETTE ST. • CHICAGO STORE: 570 WEST RANDOLPH ST. • SAN FRANCISCO STORE: 1180 FOLSOM ST.

The Most Powerful Milling M





Using a 30 hp Kearney & Trecker CSM Horizontal with carbide cutters, total production time reduced 43% on this face milling operation.

Production details: — *Workpiece* — spindle block; *material* — cast iron; *cutter* — 12 inch — 26 tooth, full-back face mill; *surface speed*—295 sfm; *feed per tooth* — .014 inch; *depth of cut* — 3/16 inch to 1/4 inch.

Machines of Their Type!

20-30-50 hp

Kearney & Trecker CSM's

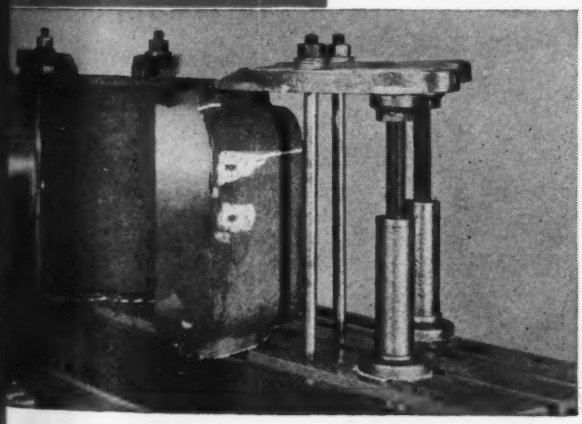
★ You get new high rates of metal removal—ferrous and non-ferrous — without sacrifice of precision.

★ —you get closer tolerances—finer finishes—precision performance — through smooth flow of power to the cutter.

★ —expressly designed for carbide milling of steel but adapted to all-purpose milling, as well.

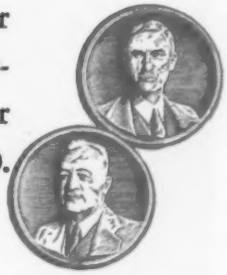
★ —broad range of application — wide range of speeds and feeds.

★ —exceptional ease of operation — centralized conveniently located controls.



Machine Time Reduced 87%:—surface finishes improved when this operation was performed on a 20 hp CSM Horizontal using carbide milling cutters! *Workpiece* — bearing shell; *material* — cast steel; *cutter* — 10 inch, 12 tooth CSM face mill; *surface speed* — 460 sfm; *feed per tooth* — .010 inch; *depth of cut* — 3/16 inch to 1/4 inch.

Engineered—from the ground up—for every milling need of today and tomorrow — investigate Kearney & Trecker CSM's; write for Catalog No. CSM-20.



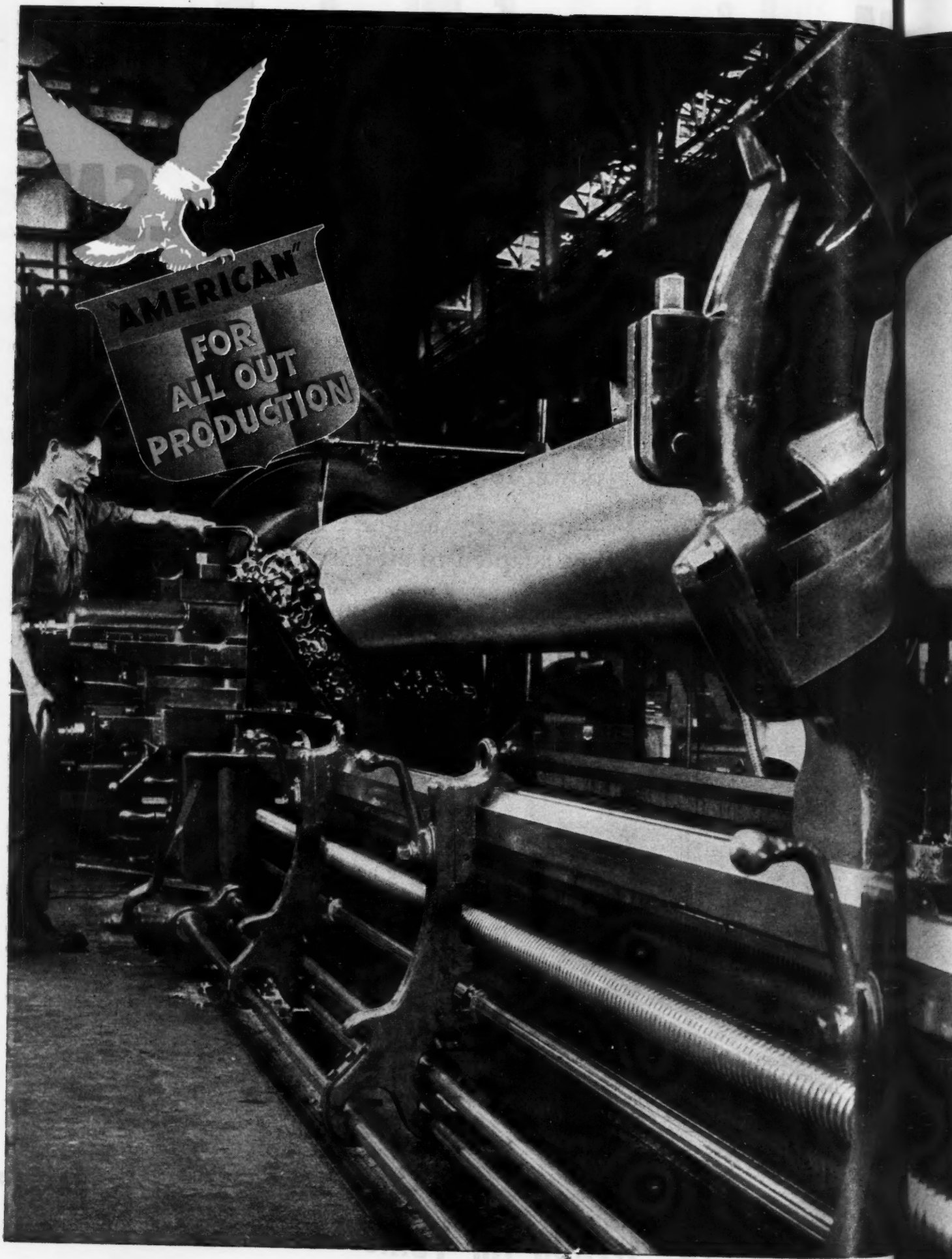
471

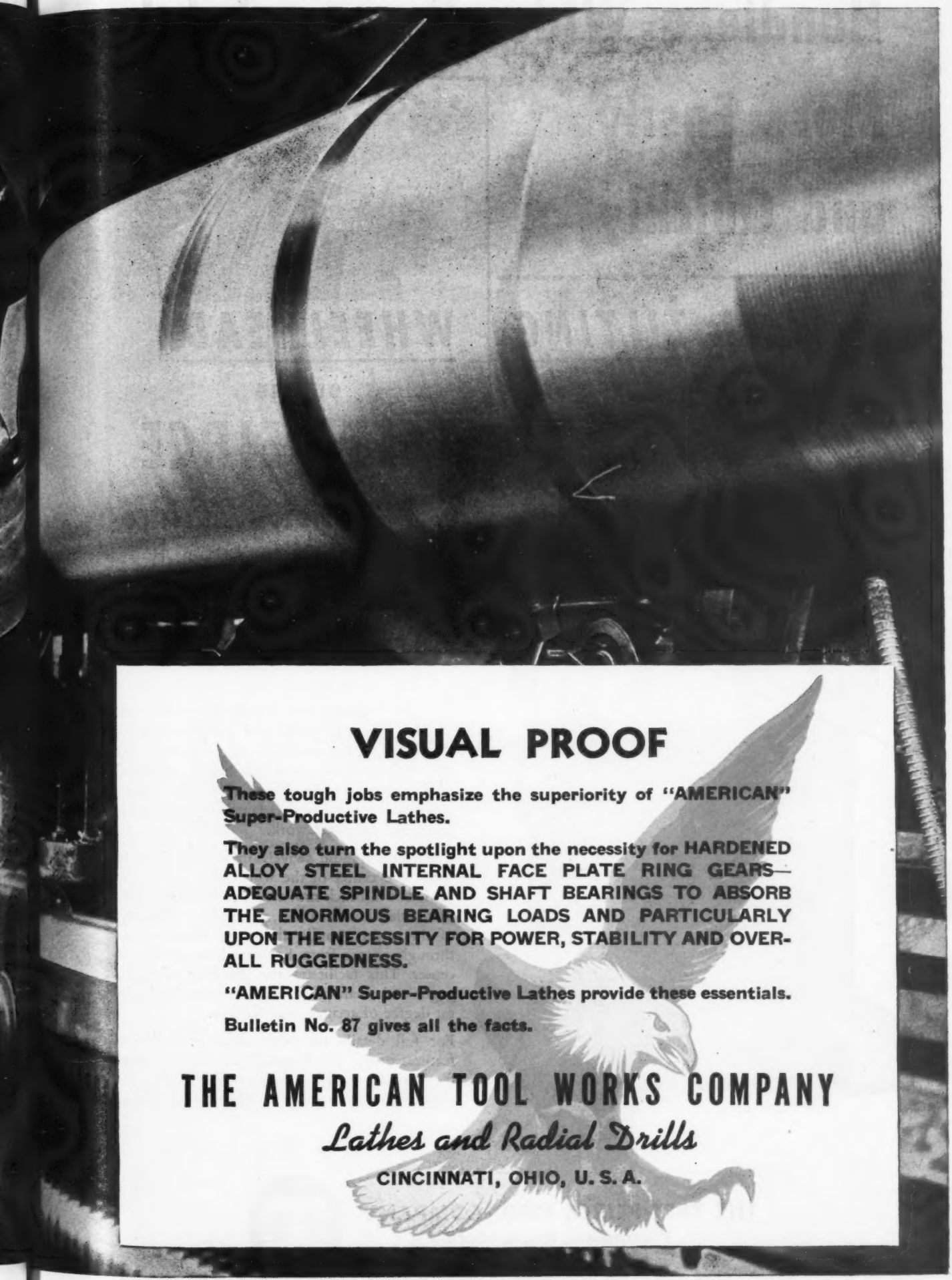
Kearney & Trecker

CORPORATION

MILWAUKEE 14, WISCONSIN

"Be Ready for Tomorrow—with CSM's!"


AMERICAN
FOR
ALL OUT
PRODUCTION



VISUAL PROOF

These tough jobs emphasize the superiority of "AMERICAN" Super-Productive Lathes.

They also turn the spotlight upon the necessity for HARDENED ALLOY STEEL INTERNAL FACE PLATE RING GEARS—ADEQUATE SPINDLE AND SHAFT BEARINGS TO ABSORB THE ENORMOUS BEARING LOADS AND PARTICULARLY UPON THE NECESSITY FOR POWER, STABILITY AND OVER-ALL RUGGEDNESS.

"AMERICAN" Super-Productive Lathes provide these essentials.

Bulletin No. 87 gives all the facts.

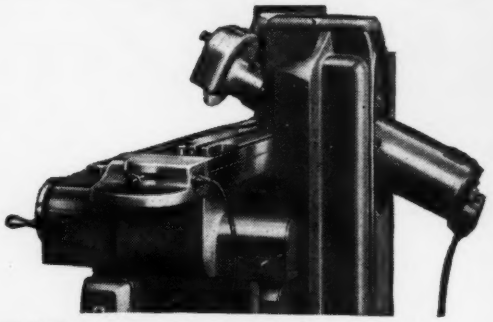
THE AMERICAN TOOL WORKS COMPANY

Lathes and Radial Drills

CINCINNATI, OHIO, U. S. A.

Handle a Wider Range of Jobs More Easily and Quickly

...with this TILTING WHEELHEAD on the TAFT-PEIRCE No. 1 Precision Surface Grinder



THIS EXCLUSIVE FEATURE makes quick and simple work of many operations which—on other machines—require slow and complicated tool set-ups. More than that, the *tilting wheelhead* provides ready adaptability to difficult angle and shoulder work.

The wheel-spindle swivels in a vertical plane about the center of the wheel. The spindle is carried in a block mounted between two pairs of circular dovetail slides, permitting swivelling of the entire spindle about the wheel center through an arc from horizontal to 30° below center. This facilitates the grinding of tools, gages and small parts which require the highest degree of accuracy and flatness.

For full details on this and other exclusive features of the Taft-Peirce No. 1 Precision Surface Grinder—*which is like no other machine for comparable work*—write for illustrated bulletin.

THE TAFT-PEIRCE MFG. COMPANY
Woonsocket, Rhode Island

Want to increase your cutting speed 20% . . . ?

Truly amazing results . . . speeds and feeds never before possible, have become commonplace in plant after plant which has switched to Cimcool. For this revolutionary *chemical emulsion* combines friction reduction and cooling capacity in a degree never before attained.

and CIMCOOL also offers you . . .

- Uniform work temperature (increases accuracy).
- No fire hazard—No smoke—No slippery film.
- Chemical lubricity (increases tool life).
- Long-lasting rust inhibitor.
- Non-irritating—doesn't grow rancid.
- Covers 85% of all metal working jobs.

CIMCOOL DIVISION OF
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.

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STAPLES TOOL & ENGINEERING CO. INCREASED SPEEDS 1/5 WITH CIMCOOL

"On our various milling operations, we have been able to increase our feeds and speeds by approximately 20% due to the greater cooling qualities of Cimcool," writes Staples Tool & Engineering Co. of Cincinnati, O. This company's letter is typical of many in our files. We will gladly show you others. *Write today!*

CIMCOOL

THE MULTI-PURPOSE CUTTING FLUID

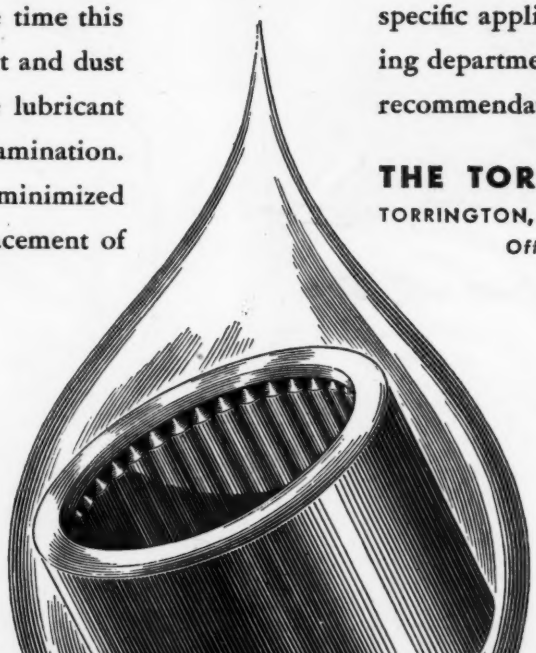
They make the lubricant last longer...

Yes, whatever the load, speed or service requirements of the installation, Torrington Needle Bearings help conserve lubricant... prolong its effective life.

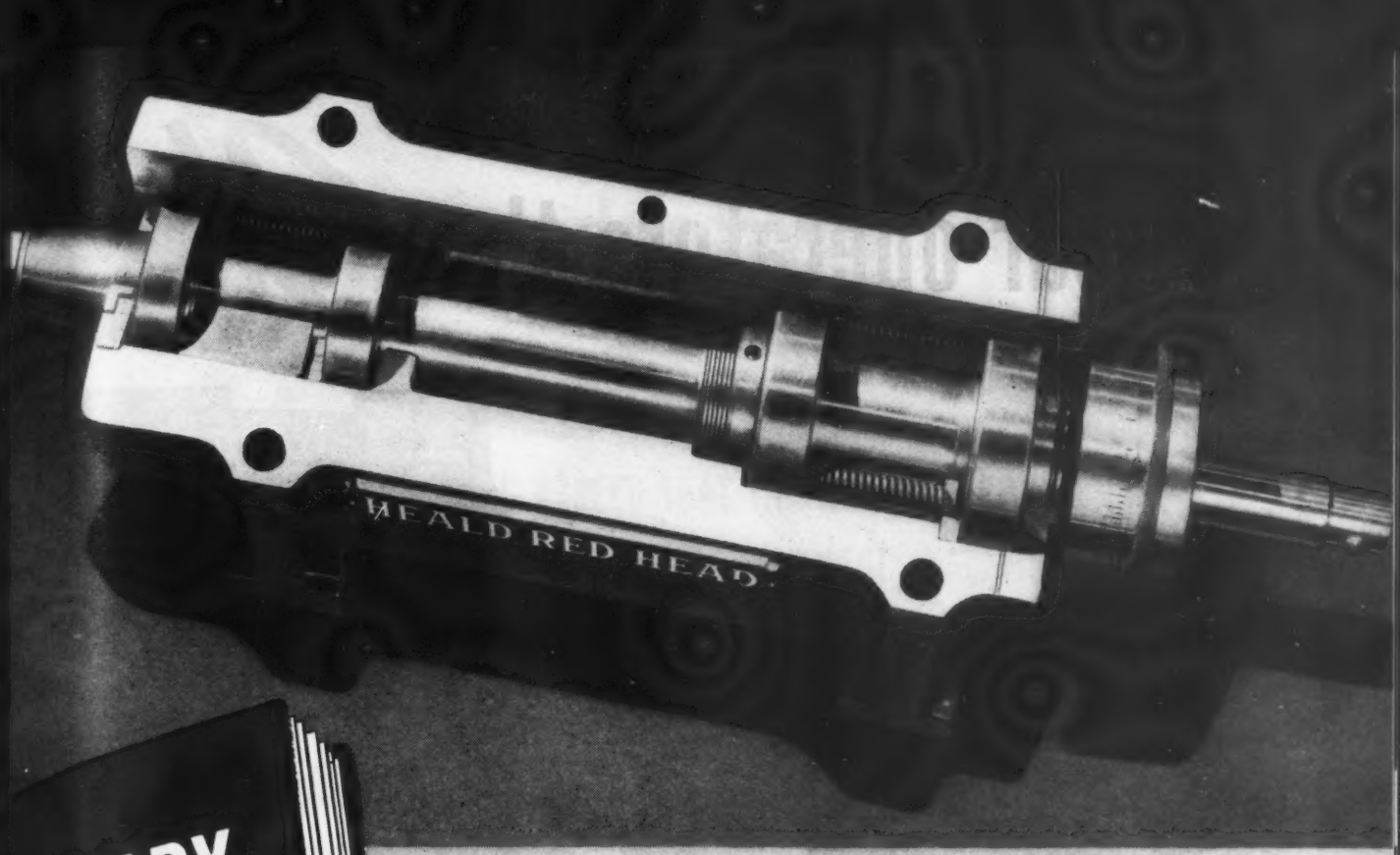
That's because there is an extra margin of lubrication efficiency in Torrington Needle Bearings due to their basic design . . . *the turned-in lips of the hardened retaining shell which provide a natural reservoir for retention of the lubricant.* At the same time this same feature helps to exclude dirt and dust from vital bearing surfaces. The lubricant is kept clean and free from contamination. Consequently, bearing wear is minimized ...less frequent renewal or replacement of the lubricant is required . . . maintenance costs are substantially reduced.

If you are seeking an anti-friction bearing for an application where high capacity, small size and economical cost are important design considerations, Torrington Needle Bearings may be *your* answer! You'll find a wealth of pertinent data in our Catalog No. 32, available on request. If you have a specific application in mind, our engineering department will gladly give you specific recommendations.

THE TORRINGTON COMPANY
TORRINGTON, CONN. • SOUTH BEND 21, IND.
Offices in All Principal Cities



TORRINGTON NEEDLE BEARINGS



DIARY OF A FAMOUS RED HEAD

BORN

"Red Head" Boringheads and Wheelheads were conceived in the Heald engineering rooms, after many years of experiment by top specialists in machine tool design. The "Red Head" had to be self-adjusting . . . it had to be dependable and foolproof . . . and it had to deliver the very finest in precision finishing. Result: a rugged, serviceable head, soundly constructed and adaptable to every requirement in internal grinding and borizing operations.

VITAL STATISTICS

Cutaway view above illustrates some of the exclusive features of "Red Head" design. Spindle bearings are of the angular contact type, assembled under definite spring preloading which automatically compensates for temperature expansion or contraction and wear. Oil flow to the bearings is regulated by individual felt wicks. Close-fitting baffles exclude dirt and water.

SERVICE RECORDS

The Heald "Red Head" has earned a reputation for doing its job—whether it be high speed operation rotating grinding wheels or tools, or carrying heavy work fixtures—with a minimum of maintenance and with the utmost in precision efficiency. Here are some actual "Red Head" service records from our files:

- **22,000 hours' service—in production 24 hours a day.**
- **6 years' production—no bearing replacements or repairs.**
- **24-hours-a-day production for 3 years maintaining perfect condition.**
- **8½ years' operation—36,420 hours' service.**
- **In continuous operation for 10 years—still using the original boringhead bearings.**
- **32 Bore-Matics with over 100 Heads in one plant—only one required bearing change.**
- **45 Bore-Matics in another plant—some in continuous operation for 8 years without boringhead trouble.**

Records like these, common among "Red Head"-equipped Heald machines, result in quicker set-ups, fewer delays, less down time—factors that may well mean the difference between profit and loss in your machining work. Whatever the size of your shop or the scope of your work, chances are that the "Red Head" and the men who designed it can help to give you faster, more economical production. For further information, write: THE HEALD MACHINE COMPANY, Worcester 6, Mass.

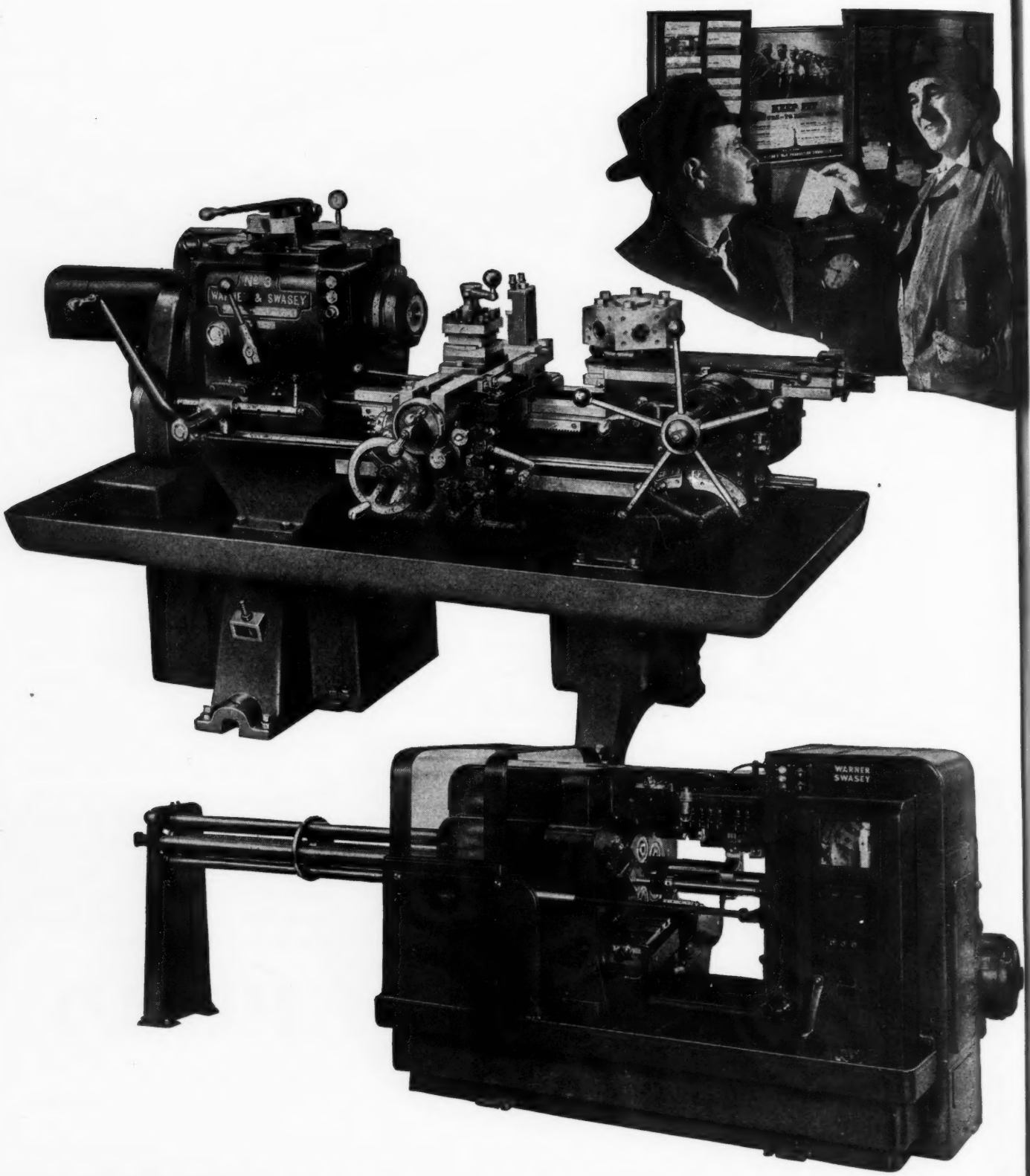
HEALD

means more precision

. . . less cost

INTERNAL AND SURFACE GRINDING MACHINES • BORE-MATIC PRECISION FINISHING MACHINES

Give your operators the *Chanc* to



YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . . . WITH A WARNER & SWASEY TUR

to be more productive!

EVERYONE SEEMS AGREED THAT THE WAY TO KEEP DOWN RISING PRICES AND PREVENT HARMFUL INFLATION IS TO INCREASE PRODUCTION WITHOUT INCREASING PRODUCTION COSTS

IN THE METAL turning industry, that puts it squarely up to the men running the machines. But can they be expected to work at a faster, harder pace—or work longer hours?

The logical solution is to provide them with newer, up-to-date machine tools that enable them to deliver more precision-finished pieces at the end of a normal working day without expending greater manual effort.

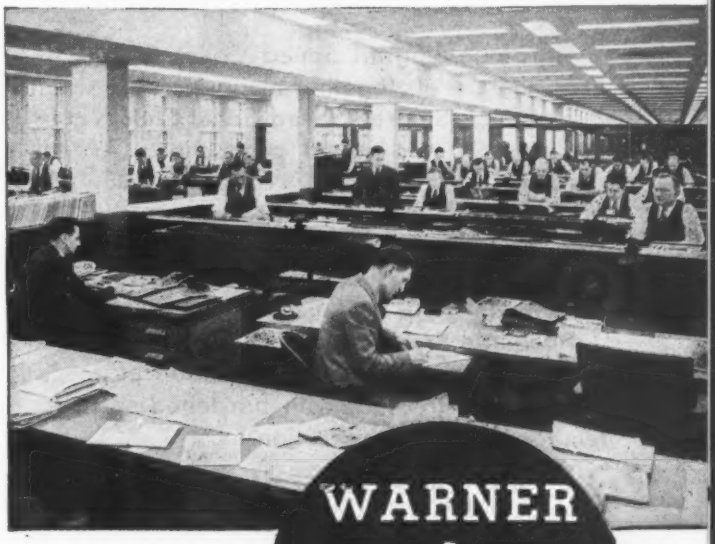
Over half of all machine tools in service in private industry are 10 years old, or older. We estimate that 54% of Warner & Swasey Turret Lathes in service in private industry are 10 years old, or older.

In many instances, replacement with new Warner & Swaseys will prove extremely profitable. In others, productivity can be greatly stepped up by installing time-saving and labor-saving devices such as power chuck wrenches, collet chuck boosters, open-type square turrets, etc.

Special tooling arrangements also offer ways to increase production.

We maintain a large engineering department devoted specifically to solving production problems through specially devised tooling.

It will pay you to investigate the possibilities of increasing production in your shop, either through new Warner & Swaseys, or by improved accessories and tooling arrangements for your present machines.



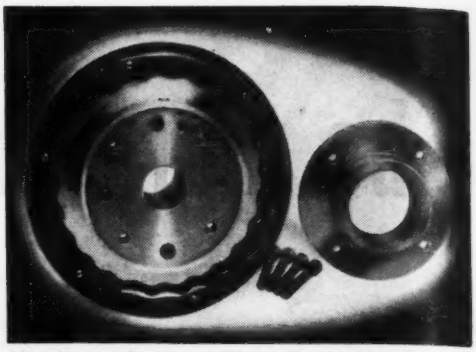
WARNER & SWASEY
Machine Tools
Cleveland

TURRET LATHES, MULTIPLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

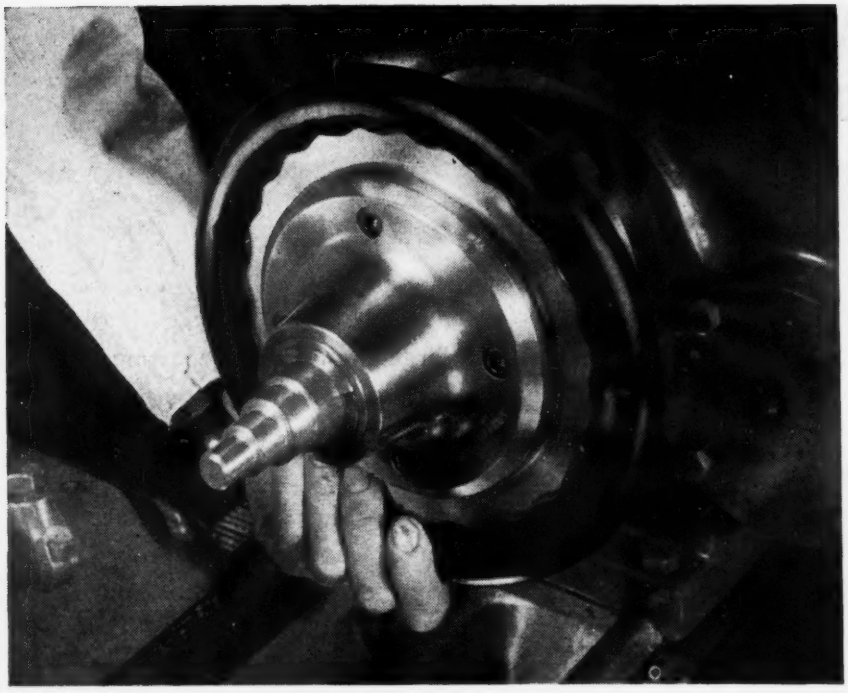
HARDINGE
ELMIRA, N.Y.

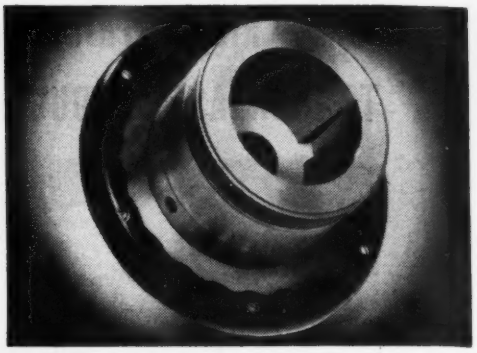
The Right Combination for Increased Production

Hardinge-Sjogren Speed Collet Chucks and Hardinge Precision Collets



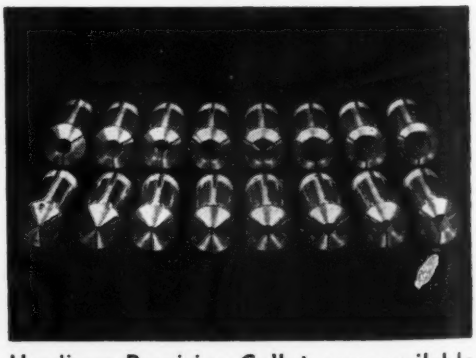
Hardinge-Sjogren Plain Back Chuck with Adapter plate for Machines with Threaded Spindle Nose.





Hardinge-Sjogren Chuck for Lathes with Tapered Key-Drive Spindle Nose.

Hardinge-Sjogren Chuck to fit directly on Lathes with Cam-Lock Spindle Nose.



Hardinge Precision Collets are available in a wide range of sizes; carried in stock in Elmira and other industrial centers.

Hardinge-Sjogren Speed Collet Chucks and Hardinge Precision Collets together mean increased production.

Hardinge-Sjogren Speed Collet Chucks give greater collet capacity and speed production. Available in three sizes, 1", 1⅜" and 1¾" collet capacity, and readily adapted for use on threaded nose, tapered-key drive, or cam lock spindles. An almost effortless turn of the wheel opens and closes the collet to release or grip the work as desired.

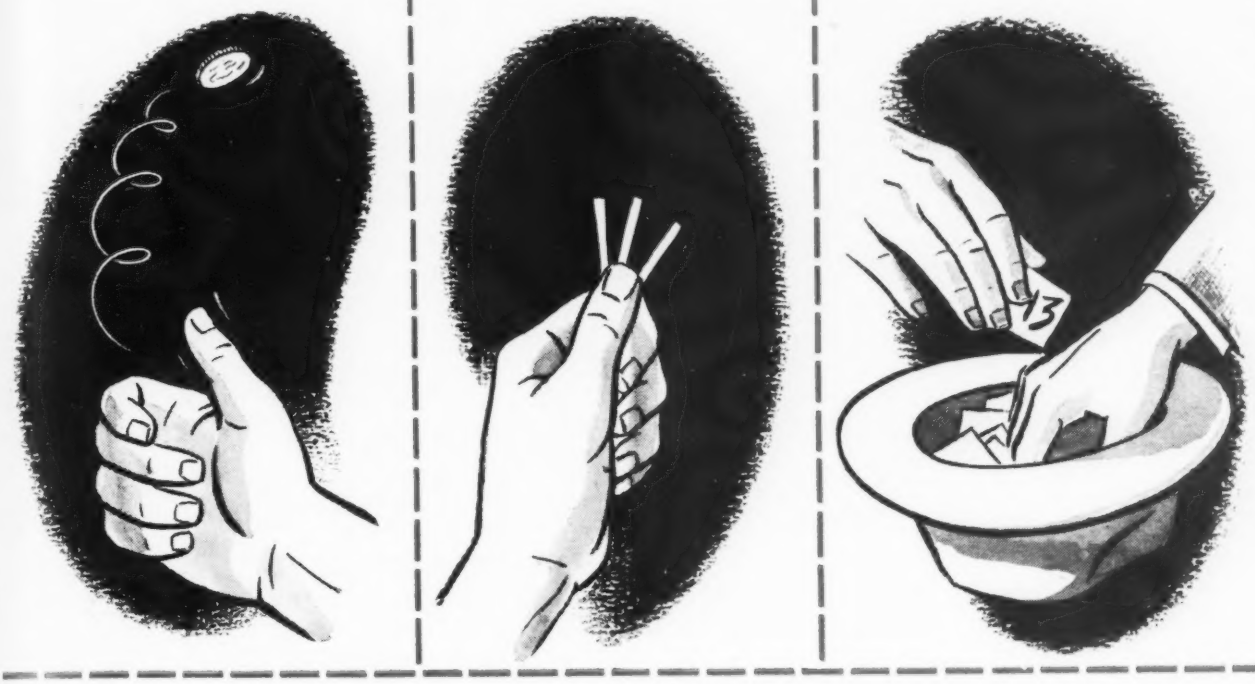
Hardinge Precision Collets symbolize accuracy, durability, and low price. They are made of special steel, uniformly heat treated, with hardened surfaces and spring temper for proper operation.

With such sure and easily adjustable holding of work, time is saved, accuracy increased and results are better. For full value from your tool room lathes, engine lathes and milling machines, equip with Hardinge-Sjogren Speed Collet Chucks and Hardinge Precision Collets.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

THERE ARE MORE WAYS THAN ONE . . . .



. . . to select a cutting oil

TOSS A COIN . . . draw straws . . . pick a number from a hat . . . they're all ways you could use to select a cutting oil. Even though you haven't tried these methods you've probably felt at times that picking the right cutting oil was mostly a gamble.

That's why Standard Oil decided a number of years ago that supplying cost saving cutting oils was only part of its job. Trained specialists were also needed to help plant men apply these cutting oils to greatest advantage—specialists who knew the available cutting oils and the types of jobs for which they were best fitted.

This know-how is the essence of Standard Oil's Cutting Oil Service. If your plant is in the Midwest you can get this service simply by calling the nearest Standard Oil office or by writing 910 South Michigan Avenue, Chicago 80, Illinois. Then put your problem up to the Cutting Oil Specialist who calls.

Standard's
CUTTING OIL SERVICE

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

RICATION ENGINEERING . . . STANDARD OIL COMPANY (INDIANA) . . . LUBRICATION ENGINEERING . . . STAND

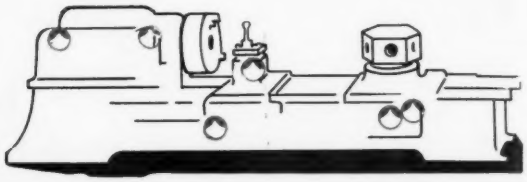
CODED LUBRICATION

tells your oilers 4 important facts... with simple numbers

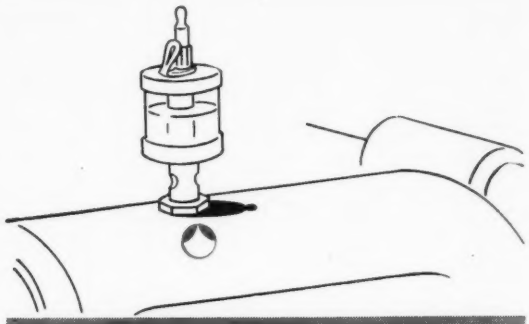
TROUBLED with getting the right lubricants in the right places? Standard's Coded Lubrication Service can help you. And it's easy to install and simple to follow.

Code numbers, not colors, are assigned to each lubricant used in your plant. Numbered decals are applied at each point to be lubricated, indicating which lubricant is to be applied. Every grease gun, oil can and storage container is numbered to indicate what lubricants are in them. Your oilers simply follow the numbers without having to remember brand names and grades.

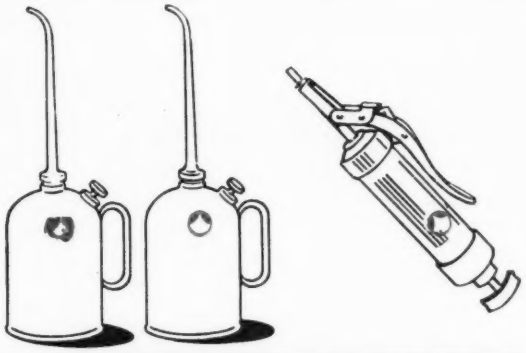
A Standard Oil Lubrication Engineer will be glad to discuss the application of Coded Lubrication in your plant. Call the nearest local Standard Oil office or write 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.



1. Where lubricant is needed



2. Which lubricant to use



3. Which oil can or grease gun to use

4. Which lubricant is in each storage container

STANDARD OIL COMPANY (INDIANA)

STANDARD SERVICE

Brown & Sharpe Spiral End Mills cut *FASTER*, more *FREELY* and require *LESS POWER*

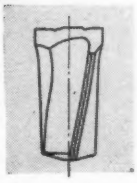
Hollow face and angle of rake

Produced by a generating process which reduces the danger of grinding burns, these edges cut more pieces per sharpening. The angle of rake reduces power consumption.

Correct number of teeth

Tooth design permits use of fewer teeth which increases cutting efficiency and enables teeth to be made much stronger with greater chip space.

Stronger teeth



The use of a double angle land, giving the desired cutting clearance without danger of the heel of the land rubbing on the work, makes these stronger teeth practical.

Correct helix angle

Two types of helix angle provide smooth cutting action . . . a small helix angle for teeth of two lipped spiral end mills for accurate milling of slots and a steep helix angle for teeth of both regular and two lipped end mills for smooth, fast-cutting action on general milling work.

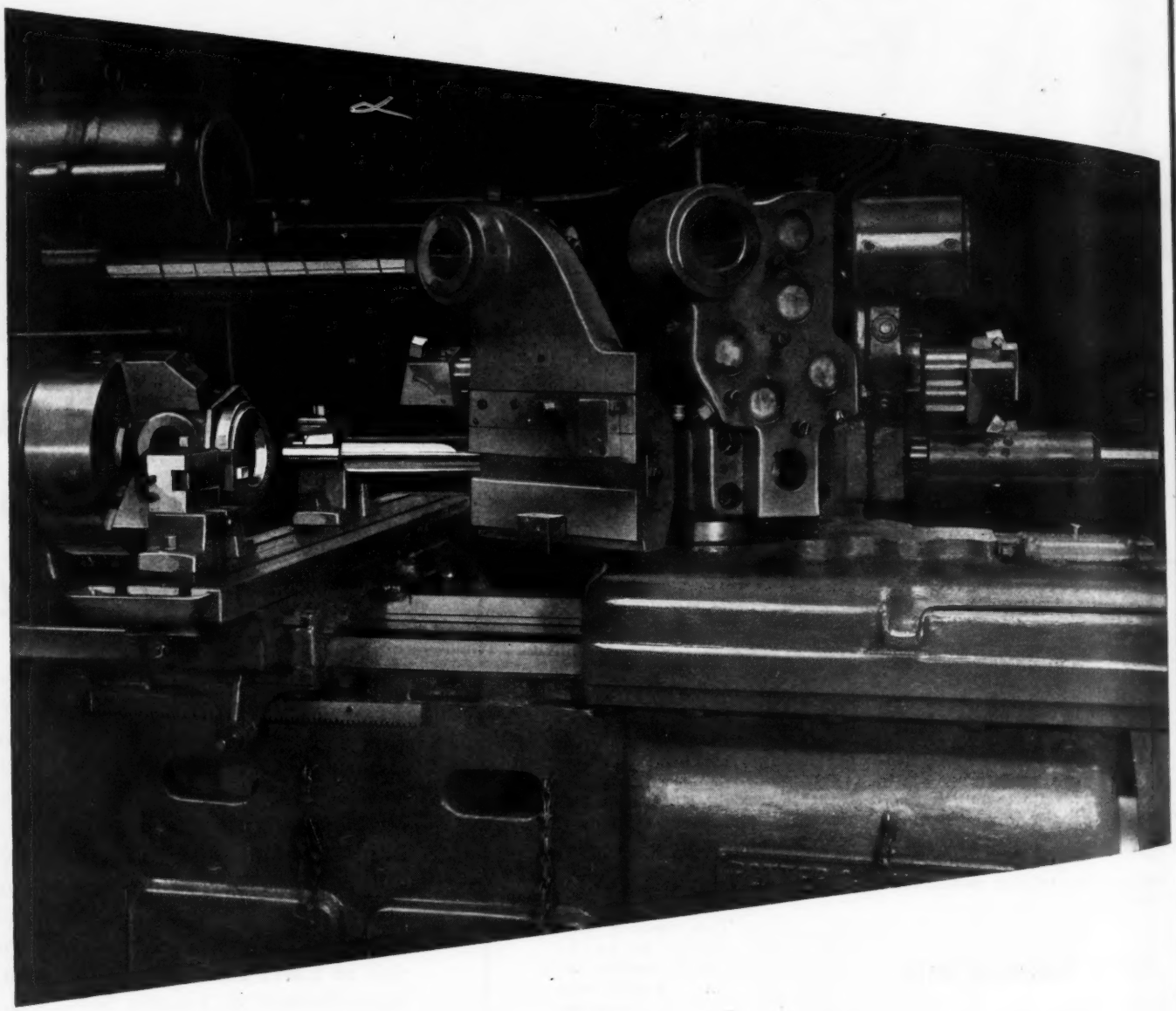
Fine design features and skilled manufacture give these end mills the qualities essential for fast production. The clean-cut chips with little discoloration – not compressed – not misshapen–are visible evidence of clean cutting action – ability to take many cuts between sharpenings with a long cutter life. Brown & Sharpe End Mills will produce more work for you at lower cost. Write for literature. BROWN & SHARPE MFG. CO., Providence 1, R. I., U.S.A.

B·S

We urge buying through the Distributor

BROWN & SHARPE CUTTERS

THE WAY TO

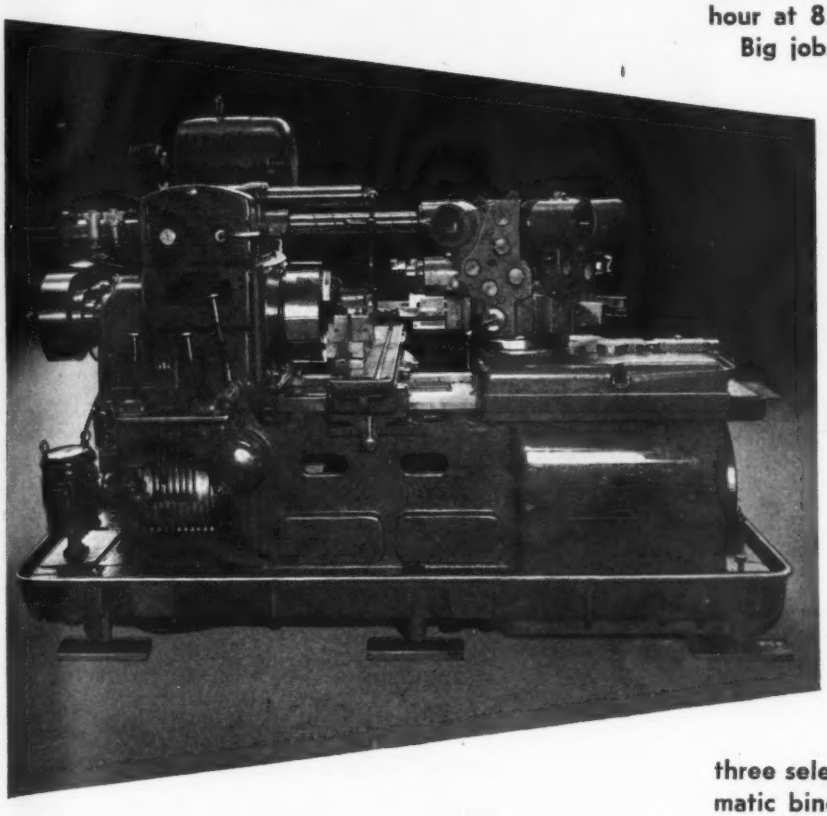


OPERATION DATA

Part: Bevel Gear Case.
Material: Gray Iron.
Method: Rough and finish boring, facing, beveling and turning operations are performed in one chucking of the work, using the 1st, 2nd, 5th and 6th turret faces only.
Average Floor-to-Floor Time per Piece: 4.24 minutes.
Pieces per Hour (figuring 85% efficiency): 12 per Machine.
One operator can handle 3 Machine Units.
Tooling for this job is shown in the photograph above. View at right shows 5DLX Automatic tooled up for a similar job on a motor housing. A finished gear housing is shown at extreme right.

POTTER &

Y TO SPEED BIG JOBS



Authorized Agents: U. S. War Assets Corporation

The part is a bevel gear case of gray iron, and the boring, turning and facing operations on it range from over 4.5 inches to 7.500 inches in diameter. Yet, in spite of the length and diameter of the cuts, the P & J 5DLX Automatic performs all the roughing and finishing operations in an average floor-to-floor time per piece of 4.24 minutes. Twelve parts per hour at 85% efficiency!

Big jobs need not be slow jobs – if they're done on P & J Automatics. The 5DLX Powerflex, for example, is designed with a swing over the cross slide of 17 inches, a swing over the bed ways of 30

inches, and other dimensions in proportion. Any group of five sets of four automatic changes of spindle speed may be made while under cut. In addition, three selective automatic changes of feed, automatic binding of the turret after index, direct cross slide action, and a constant high speed motion to the cross slide and turret slide all contribute to maximum production. Hardened and ground steel ways and heavy, box section base give the rigidity that is necessary for high accuracy on heavy cuts.

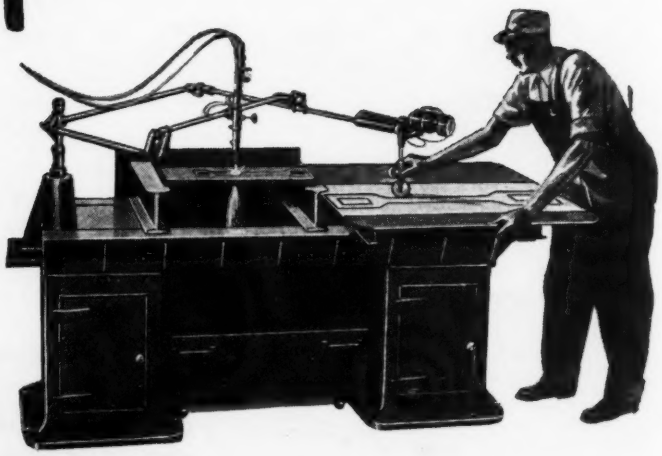
Power, capacity, accuracy—you need all three to handle large parts profitably. Send us data, and let P & J engineers show you the way to speed big jobs. POTTER & JOHNSTON MACHINE COMPANY, Pawtucket, Rhode Island.

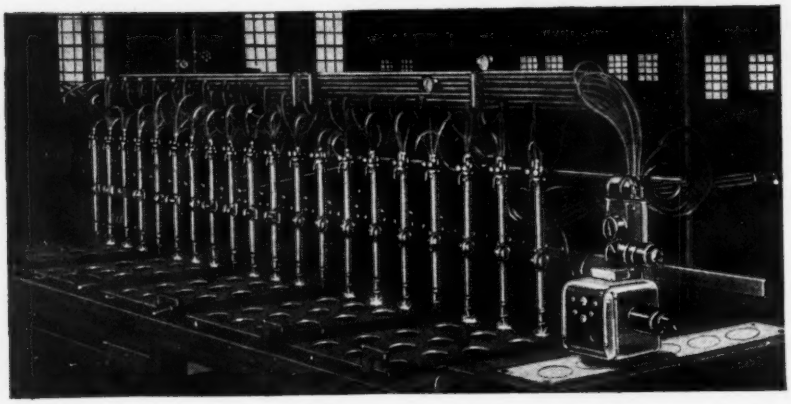
& JOHNSTON AUTOMATICS

Still looking into the Future...

Yesterday *A Major Advance*

When Airco first introduced the process of machine gas cutting, history was made. This first machine cut a variety of shapes from plate with speed and accuracy.





Today

It's Goodbye to the Past!

Continuing to pioneer, Airco developed a wide range of cutting machines—from the small, portable radiagraphs to large shape cutting machines such as the oxygraphs and travographs—engineered to meet every type of steel cutting requirement. Today's machines, incorporating advanced principles of design, operate faster and with a still higher degree of precision. As a further advancement in machine gas cutting, Airco recently introduced the "Electronic Bloodhound." This tracing device faithfully reproduces the desired design utilizing merely a simple outline drawing or silhouette.

...and tomorrow...

Airco's research and development staff will continue to contribute to new and superior ways of steel cutting and fabrication—maintaining its established tradition of progressiveness and service.

Airco's Technical Sales Division is at the call of metal fabricators in applying Airco processes in the solution of their problems. For additional information, get in touch with your nearby Airco office or write: Air Reduction, 60 E. 42nd St., New York 17, N.Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas.

AIRCO

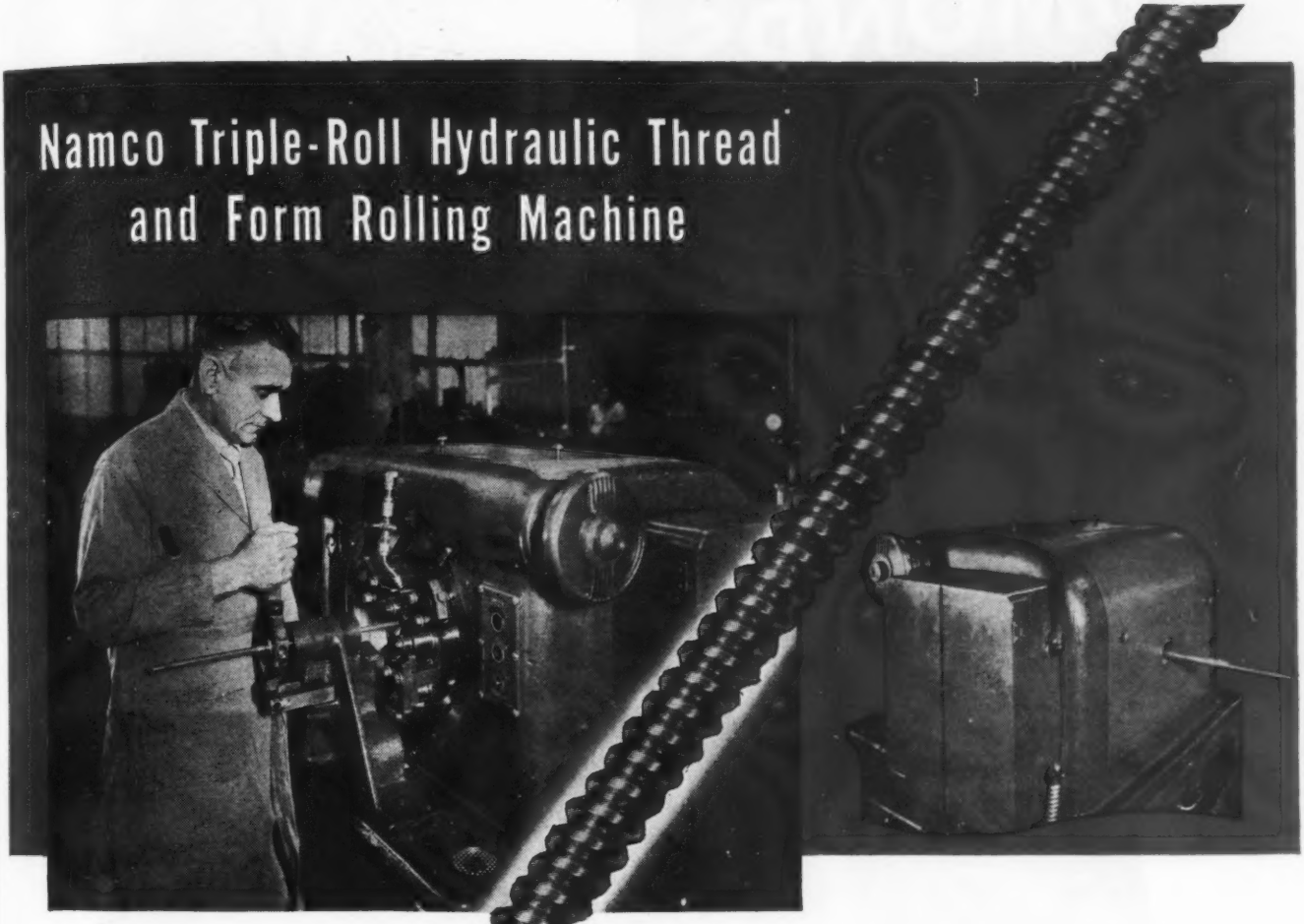
AIR REDUCTION

Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE METHODS FOR THE METAL WORKING INDUSTRIES

FOR HIGH-SPEED PRECISION THREAD-ROLLING

Namco Triple-Roll Hydraulic Thread and Form Rolling Machine



The Namco Thread Roller has *three* rolls, backed up by powerful straight line camming—for positive, equalized pressure. The result is a smoother thread, closer fit—and *no* distortion, even on hollow work.

THREADS 3 FEET LONG, ROLLED TO A CLASS 3 FIT

That's the kind of work you can do on the Namco Triple-Roll Hydraulic Thread & Form Rolling Machine—in addition to the general range of jobs in all standard pitches and in sizes from 3/8" to 1½". Operation is simple, dependable—and *versatile*. May we show you how thread-rolling the Namco way can fit your requirements?

COMPLETE DETAILS are contained in this new eight-page folder. Write today for your copy.

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

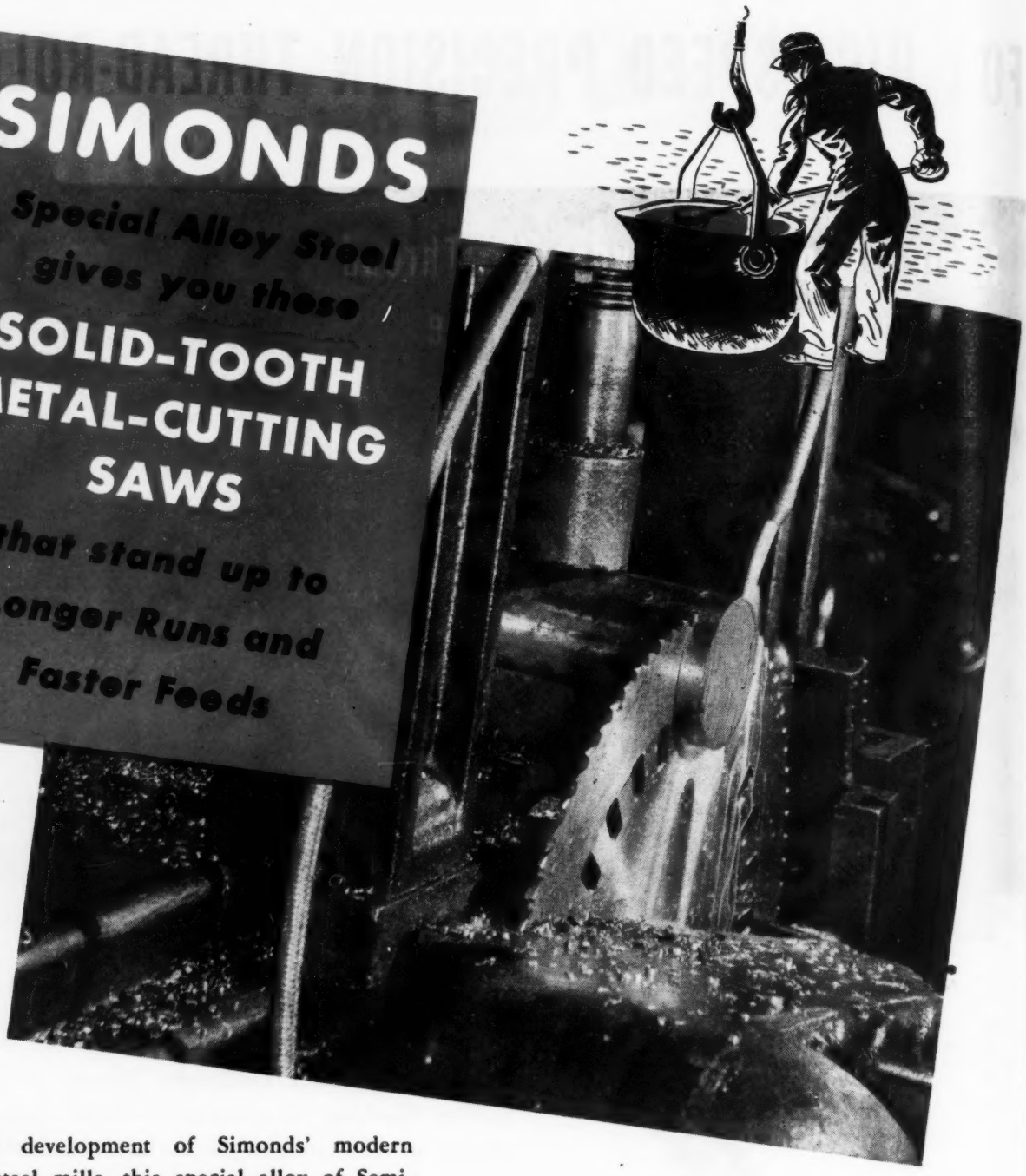
ACME-GRIDLEY BAR AND CHUCKING AUTOMATICS: 1-4-6 AND 8 SPINDLE · HYDRAULIC THREAD ROLLING MACHINES AUTOMATIC THREADING DIES AND TAPS · THE CHRONOLOG LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES SOLENOIDS · CENTRIFUGES · CONTRACT MANUFACTURING

SIMONDS

Special Alloy Steel gives you these

SOLID-TOOTH METAL-CUTTING SAWS

that stand up to Longer Runs and Faster Feeds



Exclusive development of Simonds' modern electric steel mills, this special alloy of Semi-High-Speed Steel gives you longer runs at faster feeds . . . on a wide range of work from mild steel and cold-rolled shafting to high-speed and chrome nickel steels.

Another exclusive Simonds process is the method of grinding side-clearance . . . a method which produces Solid Circular Saws with uniformly accurate rim-thickness. Then the saws are finished by still another special process which leaves no hammer-marks on the plate.

These exclusive advantages are *your triple warranty* of longer life and plus-performance in Simonds Solid-Tooth Circular Metal-Cutting Saws. Order them from your Industrial Supply Distributor or from the nearest Simonds office.

SIMONDS SAW AND STEEL CO.

FITCHBURG, MASS.

Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS STEEL MILLS — SIMONDS SAW AND STEEL CO. — LOCKPORT, N.Y. — *Special Electric Furnace Steels*

SIMONDS ABRASIVE CO. — PHILADELPHIA, PA. — *Grinding Wheels and Grains*

SIMONDS CANADA SAW CO. LTD. — MONTREAL TORONTO VANCOUVER SAINT JOHN, N.B. — *Simonds Products for Canada*

BRANCH OFFICES: 1350 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 228 First St., San Francisco 5, Calif.; 311 S.W. First Avenue, Portland 4, Ore.; 31 W. Trent Ave., Spokane 8, Wash. *Canadian Factory:* 595 St. Remi St., Montreal 30, Que.

SETS NUTS AT HALF THE COST

NUT-SETTING with socket wrenches consumed a lot of man-hours for this manufacturer of vacuum cleaners. He called in the Rotor Application Engineer for suggestions to simplify nut-setting and screwdriving operations. Result: he installed Rotor M-851, 1000 R.P.M. midget Nut Setter with X-11 Double Adjustable Clutch.

Cuts Cost 50%. Nut-setting is now an easy, one-handed job—more than twice as fast as formerly. Tool weighs less than 2 lbs.

Uniform Tightening. Rotor Adjustable Clutch permits setting of nuts to any desired tension . . . every operation uniform.

The Rotor Application Engineer will be glad to study your portable tool operations to help cut your costs.

Yours for faster production,

AIR O'TOOL

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

NO JIGS NEEDED

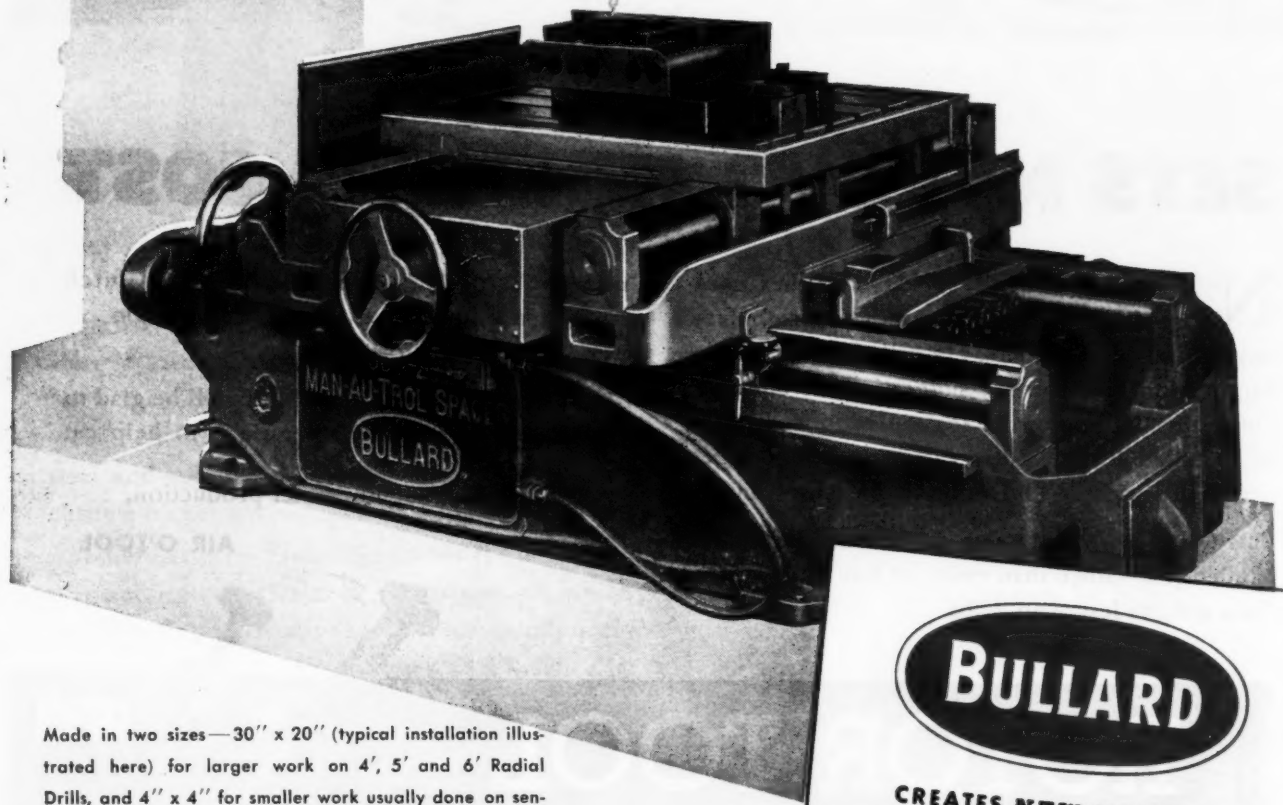
for drilling, boring, reaming and tapping

NEW Bullard MAN-AU-TROL Spacer Increases Speed and Reduces Cost of Drilling Operations

Now . . . with Bullard MAN-AU-TROL Spacers installed on your drills . . . you can start drilling, boring, reaming or tapping just as soon as your engineering drawings are ready.

Working from a master chart, the operator quickly, easily and accurately sets lateral and longitudinal position stops to match the specified pattern of holes. Then, the manually activated Spacer automatically repeats that pattern so that the holes are held *to the highest standard of commercial spacing accuracy.* Easy change-over from job to job and adaptability to an endless variety of work sizes and shapes makes the Spacer ideal for diversified shop schedules.

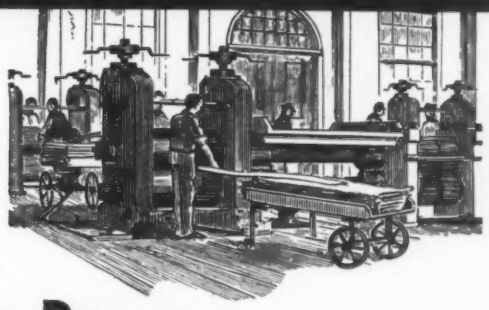
Consider the time, money and labor you will save when Bullard MAN-AU-TROL Spacers eliminate the need for designing, making, handling, repairing and storing hole-locating jigs. Write for MAN-AU-TROL Spacer Bulletin. The Bullard Company, Bridgeport 2, Connecticut.



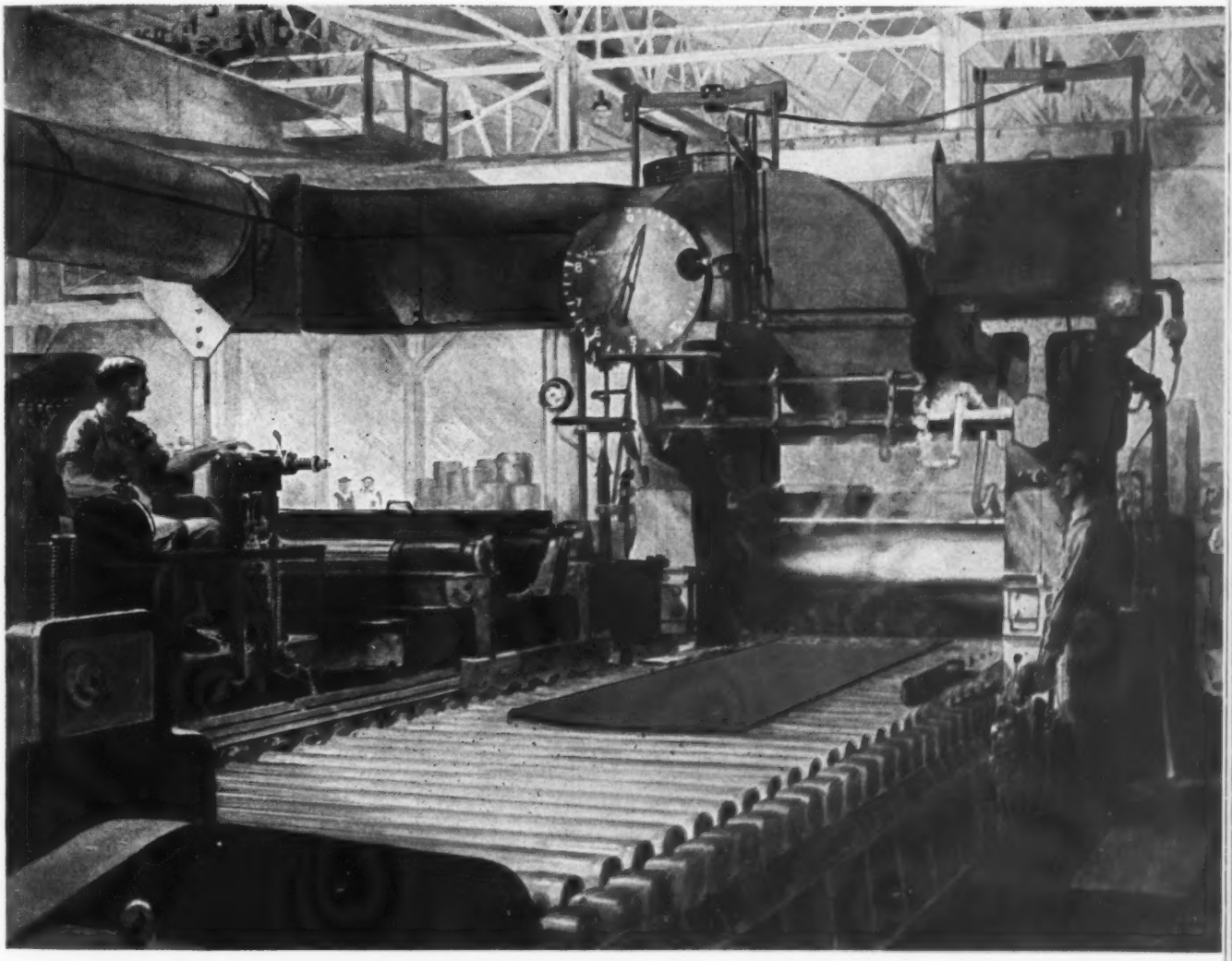
Made in two sizes—30″ x 20″ (typical installation illustrated here) for larger work on 4′, 5′ and 6′ Radial Drills, and 4″ x 4″ for smaller work usually done on sensitive drills.

BULLARD

CREATES *NEW METHODS* TO MAKE MACHINES DO MORE



A century of progress in the Art of Making Brass



A hundred years ago, the country's entire output of brass averaged about a ton a week—an amount that, today, would take only a few minutes to pass through the breakdown rolls of a modern high speed reversing mill.

While progress in brass making is evident at every turn, its production, to meet Industry's specialized needs, is still an art. In the mills and laboratories of The American Brass Company this art of making brass is skilled craftsmanship—supported by a planned program of metallurgical research and unrelenting technical control of every step of production.

The Anaconda Trademark, portrayed on the following page, is your assurance of time-tried, dependable metals, unsurpassed in quality and uniformity.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA

from mine to consumer

REG. U.S. PAT. OFF.

Anaconda Copper & Brass

ANACONDA
from mine to consumer
REG.U.S. PAT.OFF.

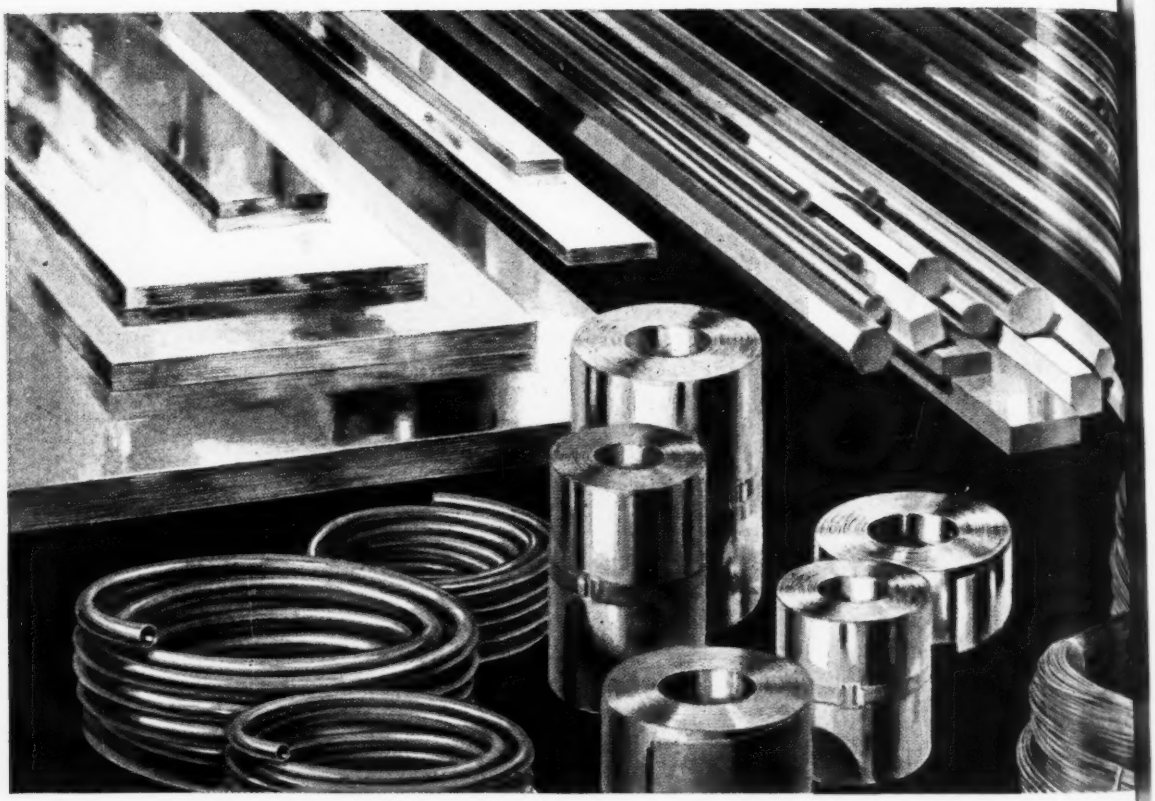
from mine to consumer

SHEETS

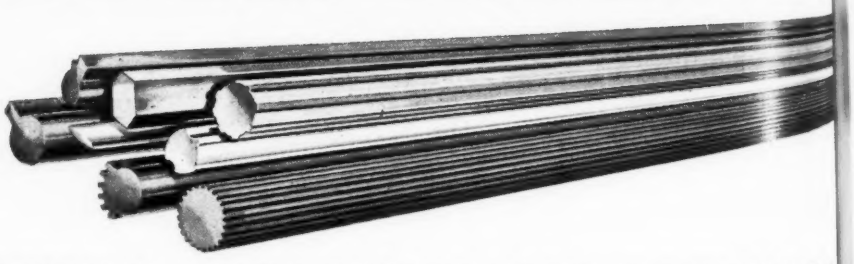
WIRE

RODS

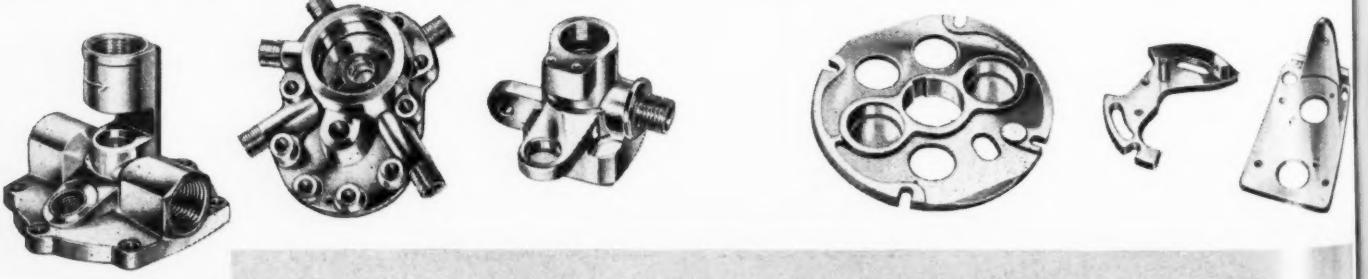
TUBES



SPECIAL SHAPES



HOT PRESSED FORGINGS • PRESSURE DIE CASTINGS



Made by **THE AMERICAN BRASS COMPANY**

General Offices: Waterbury 88, Connecticut • Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

HOW TO GET BETTER SMALL GEARS

GO to a *specialist* when you want the best. Whether it's surgery or Small Gears, that same principle applies. When you come to G.S. with Small Gear problems you employ the services of highly skilled craftsmen . . an organization of *specialists* who have concentrated upon the quantity production of better Fractional Horsepower Gears *exclusively* for more than twenty-five years! Here, every conceivable facility is maintained at peak efficiency for doing a better job at low cost. G.S. engineers will lend you valuable aid if you'll just ask for it! Submit *your* problem today or write for the new G.S. folder.

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GS

GEAR Specialties

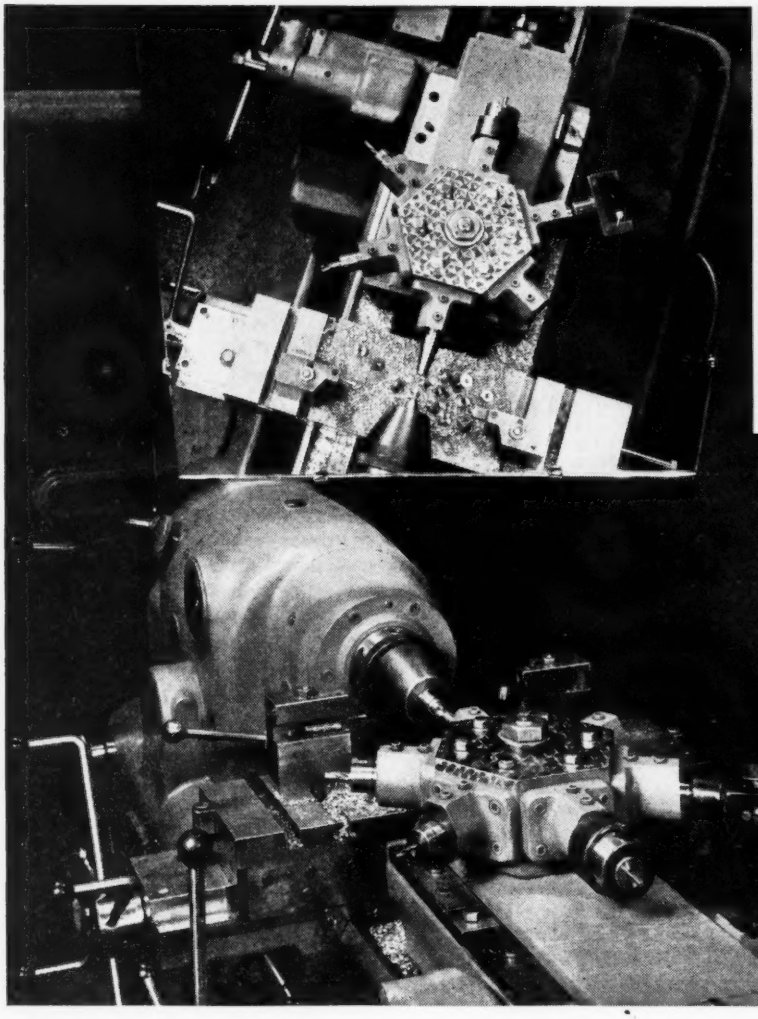
Spurs • Spirals • Helicals • Bevels • Internals • Worm Gearing • Racks • Thread Grinding

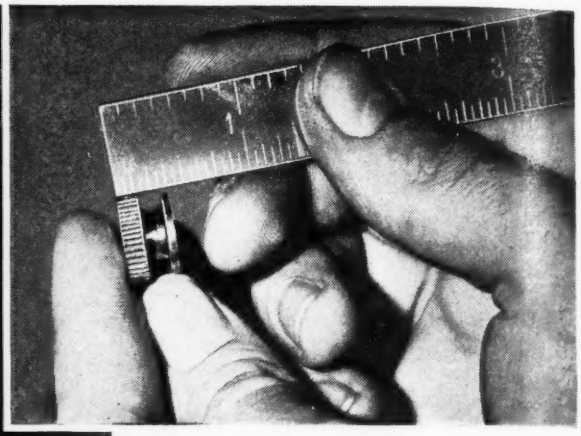
2635 WEST MEDILL AVENUE • CHICAGO 47, ILLINOIS

MEMBER OF

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

36.6 SECONDS FROM BAR TO FINISHED PART





Part—Knurled Clamp Nut
Material—Brass, 5/8" Bar Stock
Preselected Spindle Speeds—5
Time Per Piece—36.6 Seconds
Setup Time—43 Minutes

Here's another outstanding case of Speedi-Matic savings on repetitive manufacturing—knurled nuts rolling out at the rate of almost 100 an hour!

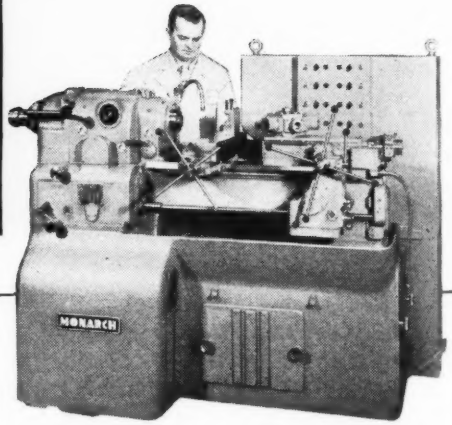
Each nut requires six speed changes per cycle. Time: 36.6 seconds! Small wonder that users everywhere are calling the Speedi-Matic "the world's fastest hand screw machine!"

The Monarch Mirror shows the reflection of this efficient production setup: 7 operations, using 5 positions on the hexagon turret, plus the front and rear cut-off slides. The tooling is typical of the class of job on which you can save time and money with a Speedi-Matic. It combines maximum production with extreme accuracy on lots of 25 to 500 or more. Get the full facts *now*, while deliveries are still favorable.

THE MONARCH MACHINE TOOL CO.
Sidney, Ohio

ACCURACY · ECONOMY · LONG LIFE

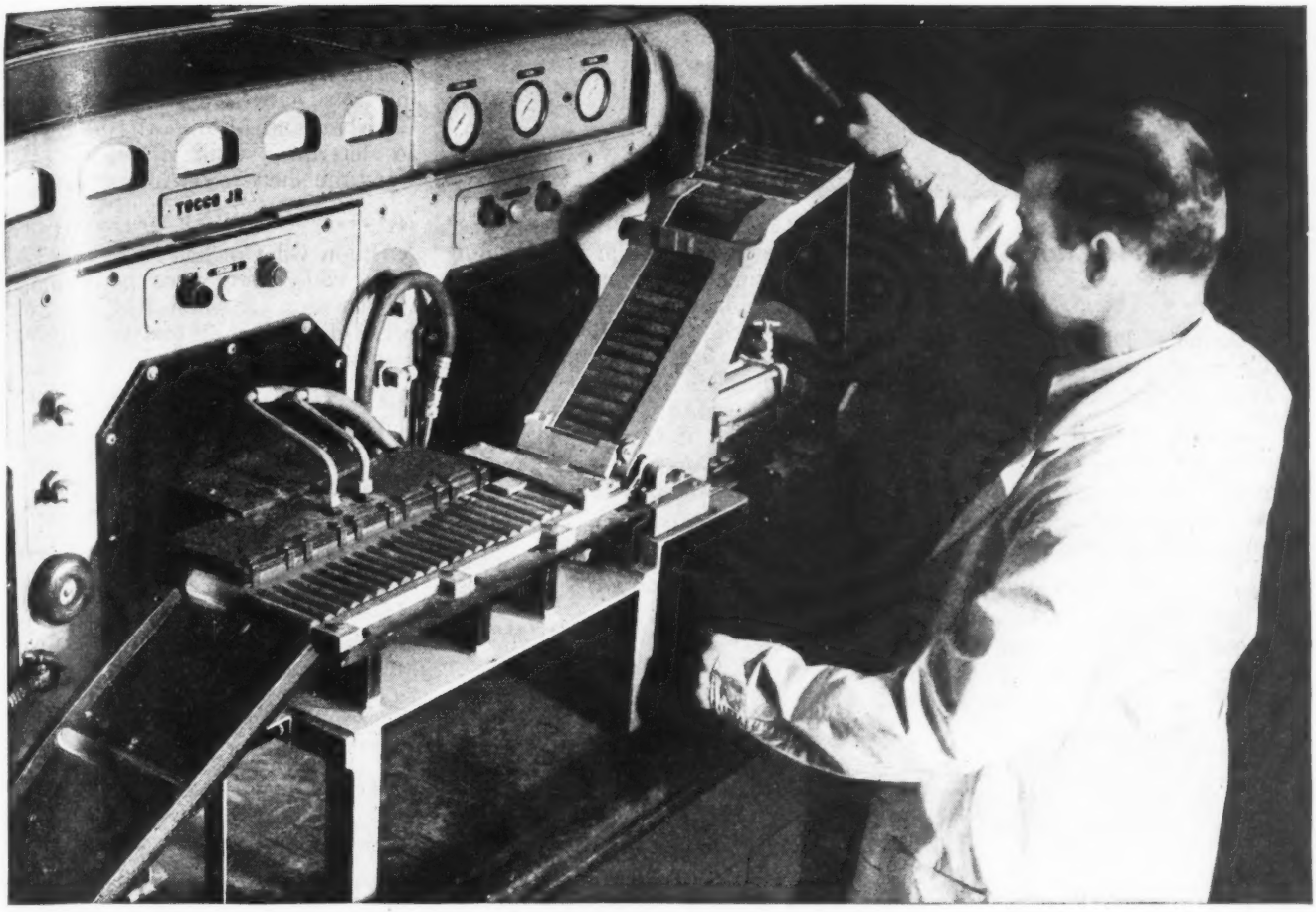
Monarch TURNING MACHINES



FOR PEAK PRODUCTION AT A PROFIT SPECIFY SPEEDI-MATIC

Here's what you get:

- Automatic electronic speed change, preselected for as many as ten stations.
- Complete range of spindle speeds—50 to 5000 rpm.
- Feeds from .0005" to .016" per revolution.
- Power feed ram-type turret.
- Spring-return hand-operated cut-off slide.
- Air-fed pusher-type collet attachment.
- Collet chuck capacity—7/8".



2000° F at a 4-second clip with TOCCO

STEEL bars ride down this "roller coaster", travel through an inductor which heats their ends to 2000° F and pass on to an upsetting machine . . . one every 4 seconds. The bars shown here are ¾" diameter, 6" long—heated for a 2" length.

The rapid heating for forging provided by TOCCO not only speeds production but it practically eliminates scale formation. Forging dies last longer. Closer tolerances are maintained. Finishes are smoother. And since the cool, clean TOCCO unit is located handy to the upsetting machine, working conditions are better.

The same results—faster output, lower costs, improved quality—are obtainable for metals, ferrous or non-ferrous, in shapes and sizes of almost every description. State *your* problem and the TOCCO Engineer will gladly assist.

THE OHIO CRANKSHAFT COMPANY

FREE BULLETIN

TOCCO

Mail Coupon Today

The Ohio Crankshaft Co.
Dept. M, Cleveland 1, Ohio

Send free copy "Results with TOCCO".

Name.....

Company.....

Address.....

City.....Zone... State...

The CONE AUTOMATIC MACHINE COMPANY sees many GOOD THINGS AHEAD

It is reported that . . . . . .

Amplex Division of Chrysler Corp. proposes an industry-wide study to standardize bearing sizes.

get ready with CONE for tomorrow

Dow Corning Corporation has a new white enamel made of silicone resins that approaches baked enamel in its resistance to heat.

get ready with CONE for tomorrow

Bell Telephone Laboratory engineers have demonstrated a "tone synthesizer" that can imitate the sound of any musical instrument.

get ready with CONE for tomorrow

Raytheon Mfg. Co. has a compact, rugged radar set for installation on merchant vessels.

get ready with CONE for tomorrow

An instrument called a "metal Sorter", made by Control Equipment Co. of Pittsburgh, identifies unknown metals by measuring the electricity they develop when rubbed by a known sample.

get ready with CONE for tomorrow

"Liquid Honing", a method of finishing metal surfaces with a spray of emulsion containing an abrasive as fine as 2,500 mesh, is being promoted by Vapor Blast Mfg. Co. of Milwaukee.

get ready with CONE for tomorrow

American Steel and Wire Co. has a nail that can be driven into steel with a hammer.

get ready with CONE for tomorrow

Plastics can now be dip-dyed at room temperature with solutions perfected by International Printing Ink. The color becomes integral, and the physical properties of the plastic are not changed.

get ready with CONE for tomorrow

Oil Well Chemical Service Company of Fort Worth has succeeded, with the help of Monsanto, in sealing oil wells as deep as 11,500 feet with a liquid resin that permeates rock and holds back unwanted natural gas.

A new combination tapping and threading attachment is now available for a leading line of six spindle automatics. The unit has a wide, selective, threading range; it can be mounted in any one or a number of endworking positions, as required, and it can be readily installed or changed over. A descriptive booklet is available.

get ready with CONE for tomorrow

Gulf Oil has an additive said to prevent foaming in lubricating oils.

get ready with CONE for tomorrow

University of California scientists have produced a standard for the measurement of length ten times as accurate as the cadmium light ray now accepted by using a light wave from transmuted mercury (made from gold) excited by a high frequency radio beam.

The Army and Navy are studying our natural caves, such as Carlsbad and Mammoth, in order to determine their usefulness as war-time shelters for industry.

get ready with CONE for tomorrow

Union Oil Co. has "Uniperox", a peroxide made from petroleum for use as a jet plane fuel, to improve diesel fuel oil and as a catalyst in the making of plastics.

get ready with CONE for tomorrow

The Ford Motor Company has announced its intention of erecting a $50 million laboratory for automotive research and engineering.

get ready with CONE for tomorrow

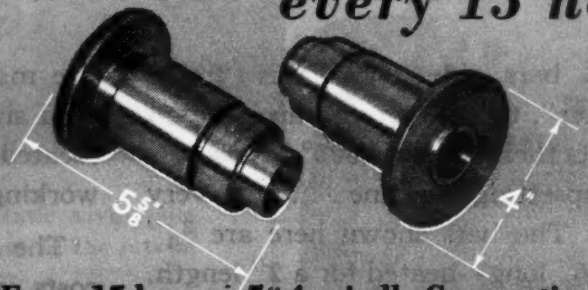
"Palestic" is a treatment for plaster which makes it as hard and strong as stone and also makes it adhere to plastics, metal or glass.

get ready with CONE for tomorrow

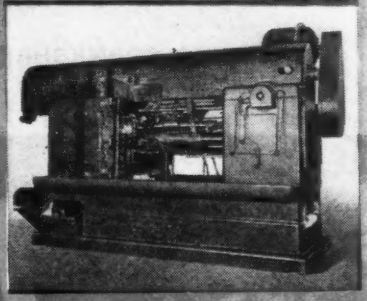
Tennessee Eastman claims that its Tenite plastic pellets blown from an ordinary blasting machine put a fine finish on aluminum castings.

FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION

A TON of Chips every 15 hours



Every 15 hours a 5" 4-spindle Conomatic removes a ton of chips from SAE X-1315 bar stock to produce this piece within the time and tolerances required.
***You* can be ahead with a Conomatic.**



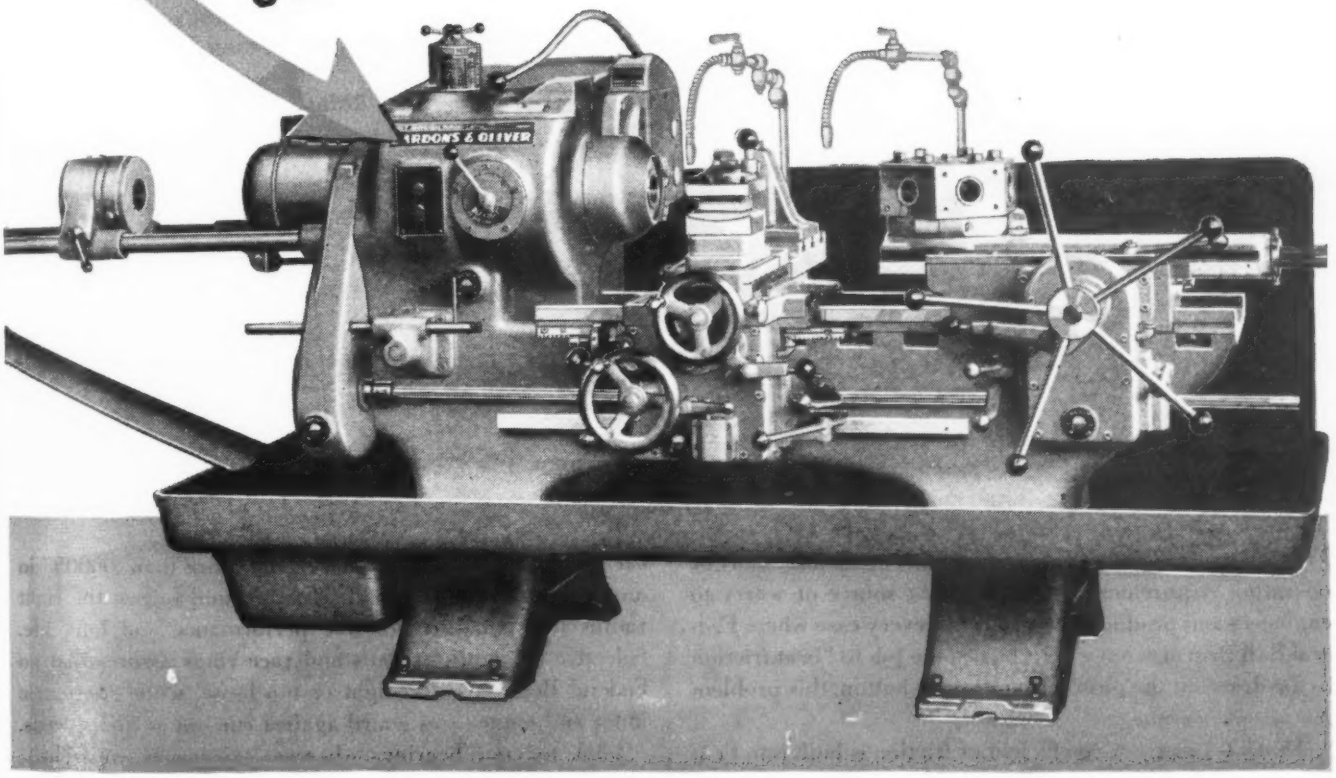
Ask your CONE *representative to show you our new color motion picture*

CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

NEW COLLET CHUCK AND BAR FEED

GIVES GREATER PRODUCTION



A "twist-of-the-wrist" feeds the bar and operates the collet chuck on the Bardons & Oliver No. 7 Universal Turret Lathe. The new feature uses hydraulic power to save you time on this part of the work cycle, reduces operator fatigue, and permits heavier cuts.

Learn more about the savings possible with a Bardons & Oliver No. 7 Universal Turret Lathe — they may be the answer to your problem of high costs.

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Friction takes its toll of power when a bearing falls short of operating requirements. It's a constant source of worry to engineers and production men. Yet in every case where Federal Ball Bearings have been put on the job to "beat friction to the draw" at the push of the starting button, this problem has been overcome.

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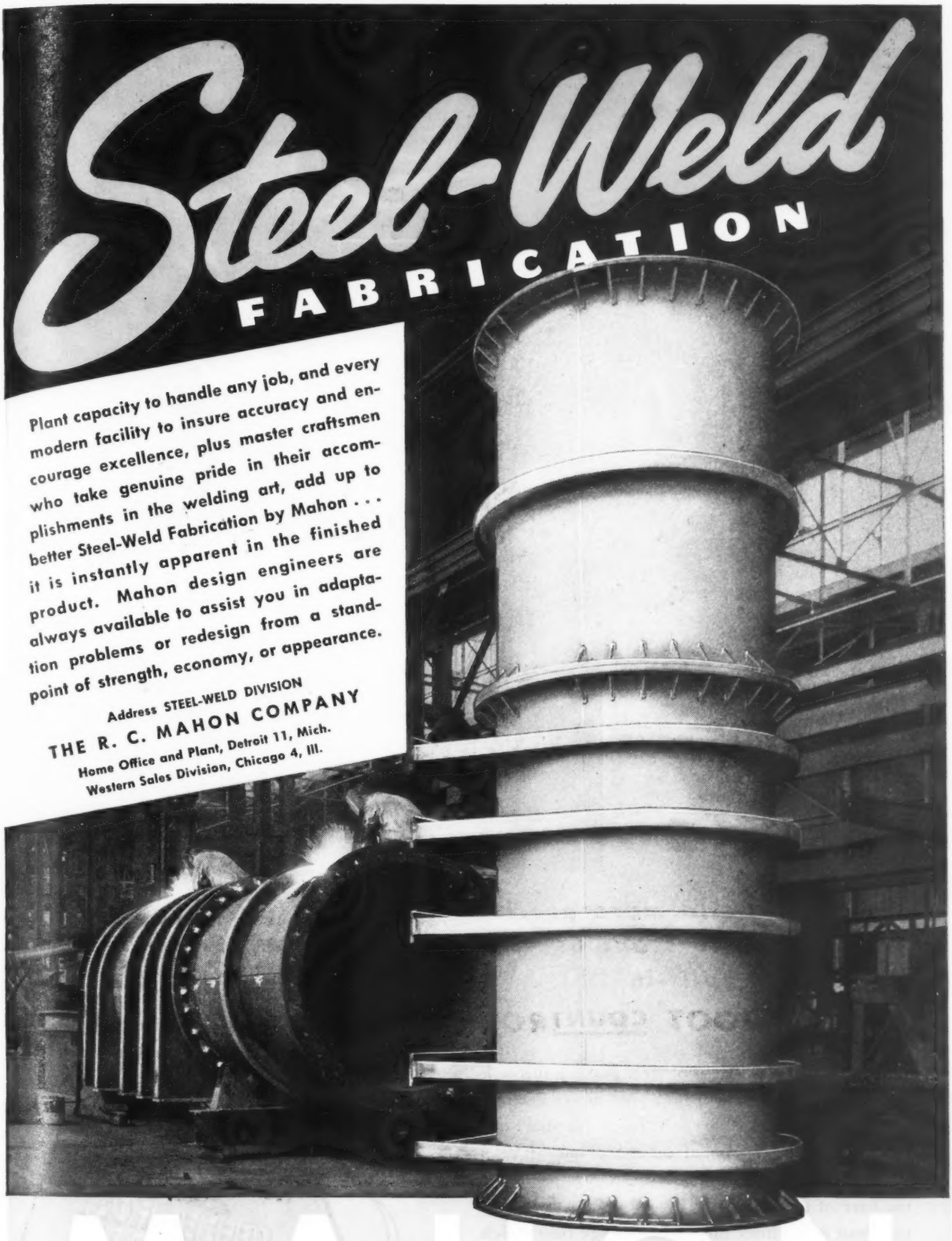

Plant capacity to handle any job, and every modern facility to insure accuracy and encourage excellence, plus master craftsmen who take genuine pride in their accomplishments in the welding art, add up to better Steel-Weld Fabrication by Mahon . . . it is instantly apparent in the finished product. Mahon design engineers are always available to assist you in adaptation problems or redesign from a standpoint of strength, economy, or appearance.

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THE R. C. MAHON COMPANY

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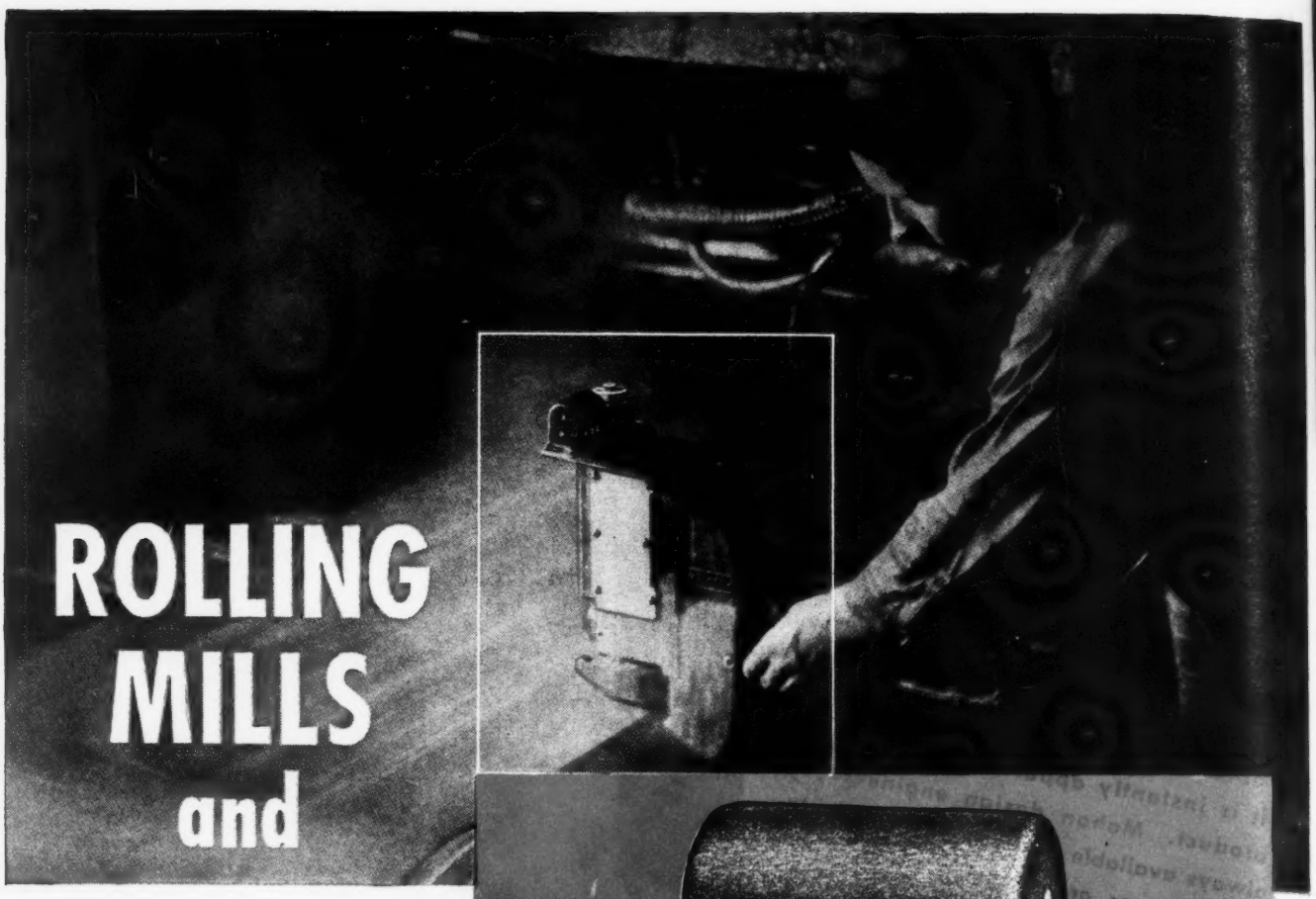

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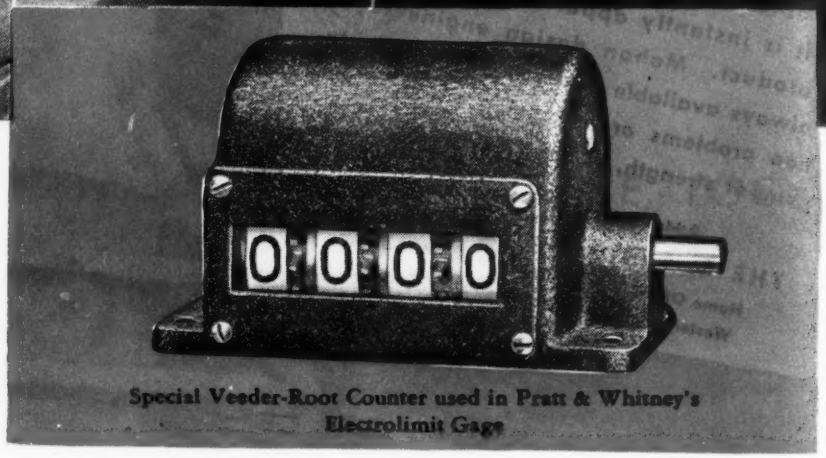

Special Veeder-Root Counter used in Pratt & Whitney's Electrolimit Gage

. . . all can build more profits for their makers and users by built-in

VEEDER-ROOT COUNTROL

Variations in thickness of steel passing through the mill are given to the operator in a direct, decimal reading down to .0001" . . . by a Veeder-Root Counting Device mounted on the pulpit. That's *Count*rol . . . and that cuts waste, builds profit for the user of the mill . . . gives extra sales-power to the Pratt & Whitney Electrolimit Gage into which the counter is built as an integral part.

This is one of a limitless number of *special* Veeder-Root Devices developed for manufacturers of all types of products in all types of industry. Let Veeder-Root engineers show you what specialized *Count*rol can do to add new utility and sales-power to *your* product. Write to Veeder-Root Inc., Hartford 2, Conn. *In Canada:* Veeder-Root of Canada, Ltd., Montreal. *In England:* Veeder-Root Ltd. (new address on request).

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H-P-M Hydro Bulging SOLVED THESE DIFFICULT METAL FORMING JOBS!

H-P-M hydraulics pioneer another revolutionary metal forming method . . . the mass production of "necked" shapes! Both drawing and bulging operations can be performed in a single H-P-M press. No additional metal forming equipment is required. Actual production of the stainless steel parts illustrated above proves that this revolutionary hydraulic technique reduces scrap loss from ten to less than one per cent over previous methods.

Are you producing similar shapes by antiquated methods? You too can step up your production rate and secure a better quality product by employing H-P-M hydraulics.

H-P-M drawing and bulging operations at International Harvester Company have been recently reviewed in a prominent metal working tradepaper. Write today for a reprint of this article and other literature describing H-P-M metal forming and drawing presses.

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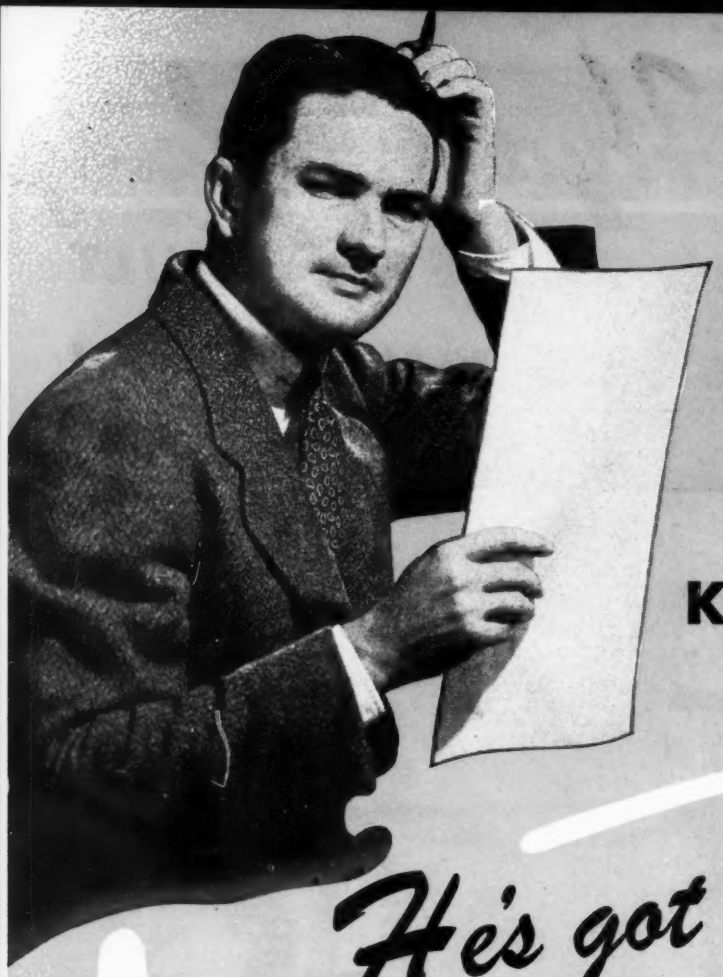
REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877



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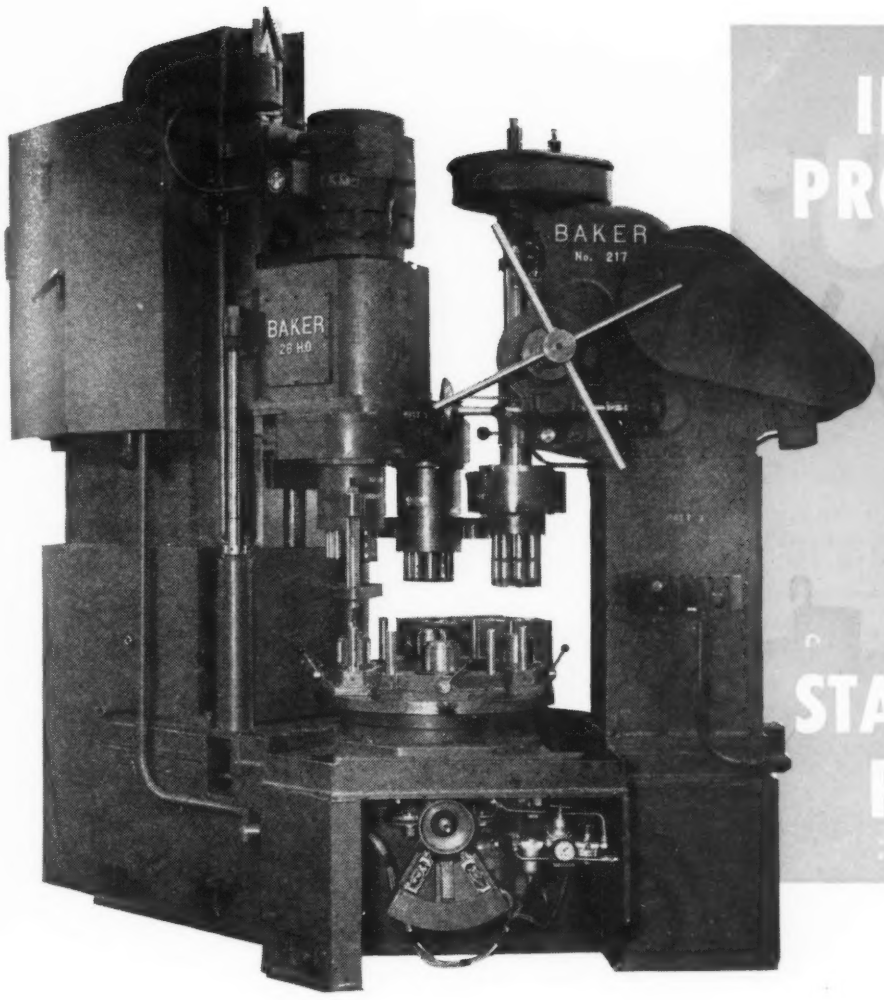

INCREASED PRODUCTIVITY

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STANDARD UNIT FLEXIBILITY

Increased productivity is the answer to the problem of producing better products for more people. Making every job more productive is the soundest approach to the problem of creating better jobs, steadier jobs, for more workers.

Baker multi-operation machines are practical demonstrations of how productivity can be increased on complex machining jobs. For example, the two-unit, multi-operation machine illustrated drills, chamfers, and taps eight holes in a hypoid bevel gear. This machine is equipped with a combination of hydraulic and mechanical geared feeding. At stations No. 1 and No. 2 the hydraulic feed handles the drilling and chamfering operations. The tapping unit at station No. 3 is arranged with a positive lead screw which insures better thread characteristics. Each unit is individually driven, and the entire machine is rigidly mounted. Automatic power index is readily accessible. This Baker machine has another important advantage, too! Because it is built from standard Baker units, it can be retooled easily merely by changing the simple, inexpensive multiple heads.

This is one of our many practical answers to the problem of getting increased productivity. If you are now using separate machines to perform milling, drilling, tapping, facing and similar operations, Baker engineers can show you how to combine these operations. Send details or prints and get our complete analysis and recommendations.

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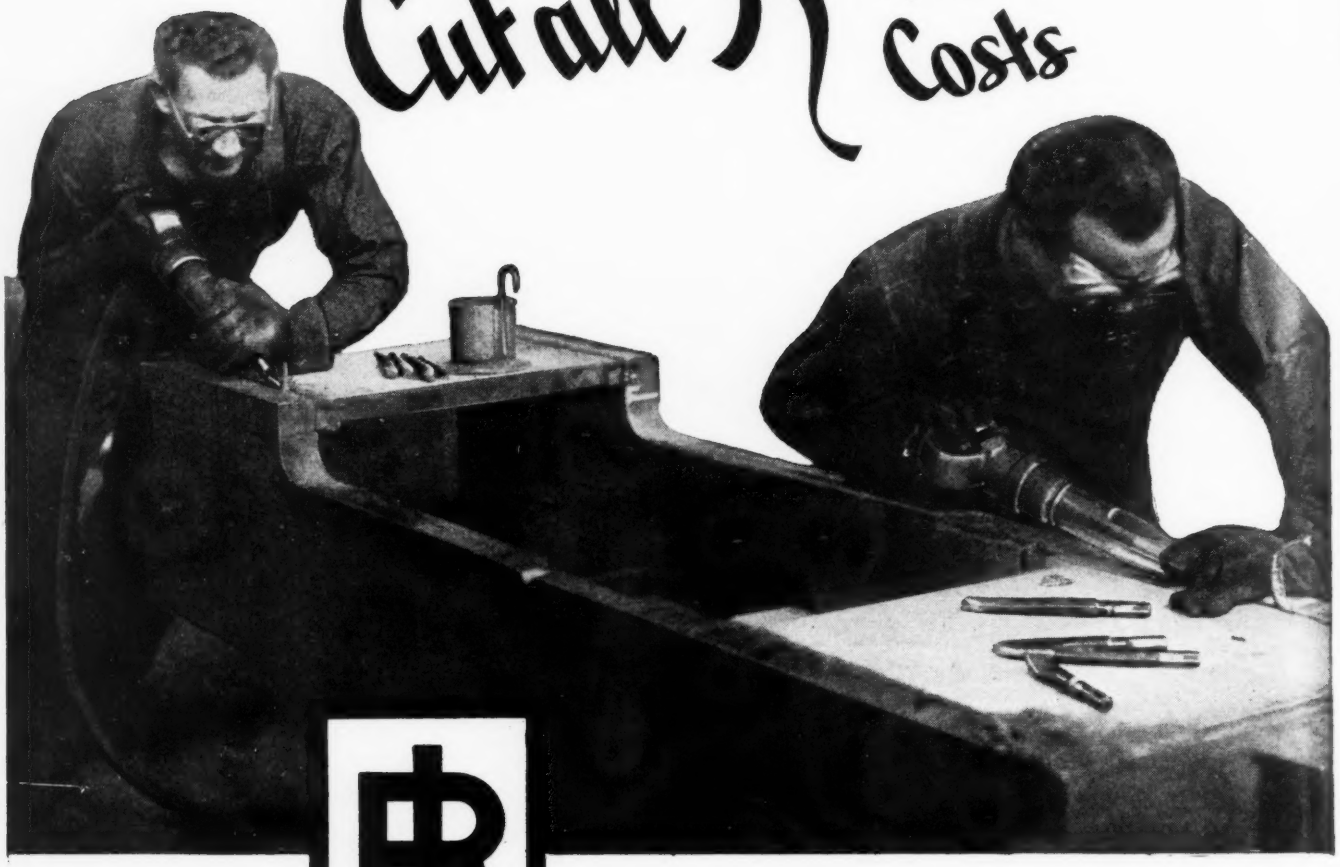
Cut all 3 { Metal Time Costs



...with I-R Chipping Hammers

The three factors that you must watch on your chipping jobs are the amount of metal removed, the time required to remove it, and the cost of removing the metal.

First: The amount of metal removed depends upon the selection of the right chipping hammer for the job. For your selection our complete line includes four different types and many sizes.

Second: The time required to remove the metal is important. Chipping hammers lead a rugged life, and their cutting efficiency may take a terrific drop if certain factors are not watched and checked periodically. Our engineers are specially trained in the proper operating and maintenance techniques required to give you the highest degree of chipping hammer "cutting efficiency."

Third: The cost of removing the metal involves factors one and two as well as several others, such as—correct air pressure at the tool—efficient layout – correct chisel shapes – standard tests for "cutting efficiency," etc.

They all sum up to the fact that I-R hammers and I-R "cutting efficiency service" can produce the results you need to turn out more and better jobs. Call our nearest office. Our engineers are ready to help you. Also yours for the asking is a two-color wall chart on chipping hammer repairs, Form 5634. Send for a copy now.

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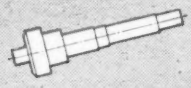
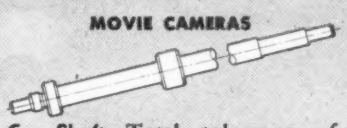


Drive Pinion Blank — 5 diameters held to .001" total tolerance; one diameter held to +.0005". Turned finish of 15 micro-inches on pivots. Material: Steel, B1113.

MOVIE CAMERAS

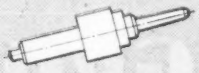


Cam Shaft—Total tolerance of +.0005" on 4 diameters. Length of piece: 2.802"; 9 micro-inches of finish on pivots. .0003" concentricity run-out-total indicator reading. Material: Steel, B1113.

OIL SPRAY REGULATORS

Nozzle Nib — Rough generated and form finished cone; tolerance of cone 120°+30′−0. 12 micro-inches of finish. Material: 430 F. stainless.

ELECTRIC METERS

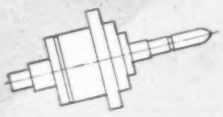


Second Train Staff Blank — .625" length overall. One generated taper: 67½° generated cut-off. Tolerance on one diameter ±.0005". Material: brass wire, free-cutting grade. Production: 480 pieces per hr. gross.

RADIO RECEIVERS

Connector — Centered, drilled .070" x 5/16", necked, turned and generated cut-off accomplished in one cycle of 6 seconds. Two diameters .060" and .104" held to ±.0003". Concentricity between hole and outside diameter .0005" total indicator reading. Material: free-cutting brass.

INSTRUMENT PARTS

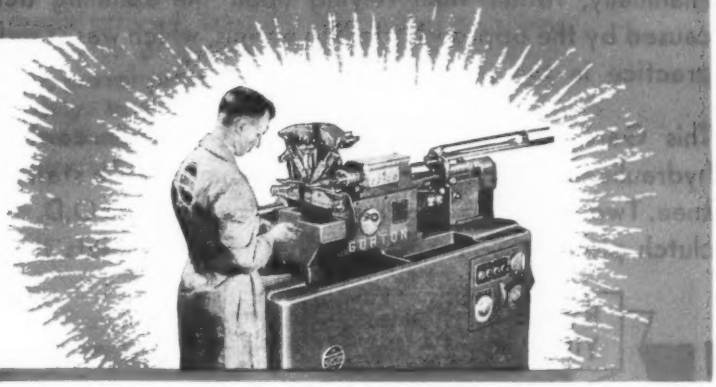


Hand Staff — 7 turned diameters 4 of which were ±.0005", 2 necking operations and formed radius. Total length .640". Concentricity .0004" total indicator reading on all diameters. Material: drill rod.

BY TOOLING THE JOB ON A GORTON (SWISS-TYPE) *Automatic*

Compare results on the jobs shown above with those of similar jobs in your own shop or with those you are sub-contracting.

See from these actual performance stories how users of Gorton Automatics are saving time and money and improving parts quality on production runs of this type. For complete details, write to Gorton Engineering Service. There is no cost or obligation involved.



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. . . a 16-page booklet containing complete details on the Gorton Automatic together with information on how to apply it to improve the speed and quality of your work. Write for your copy today.

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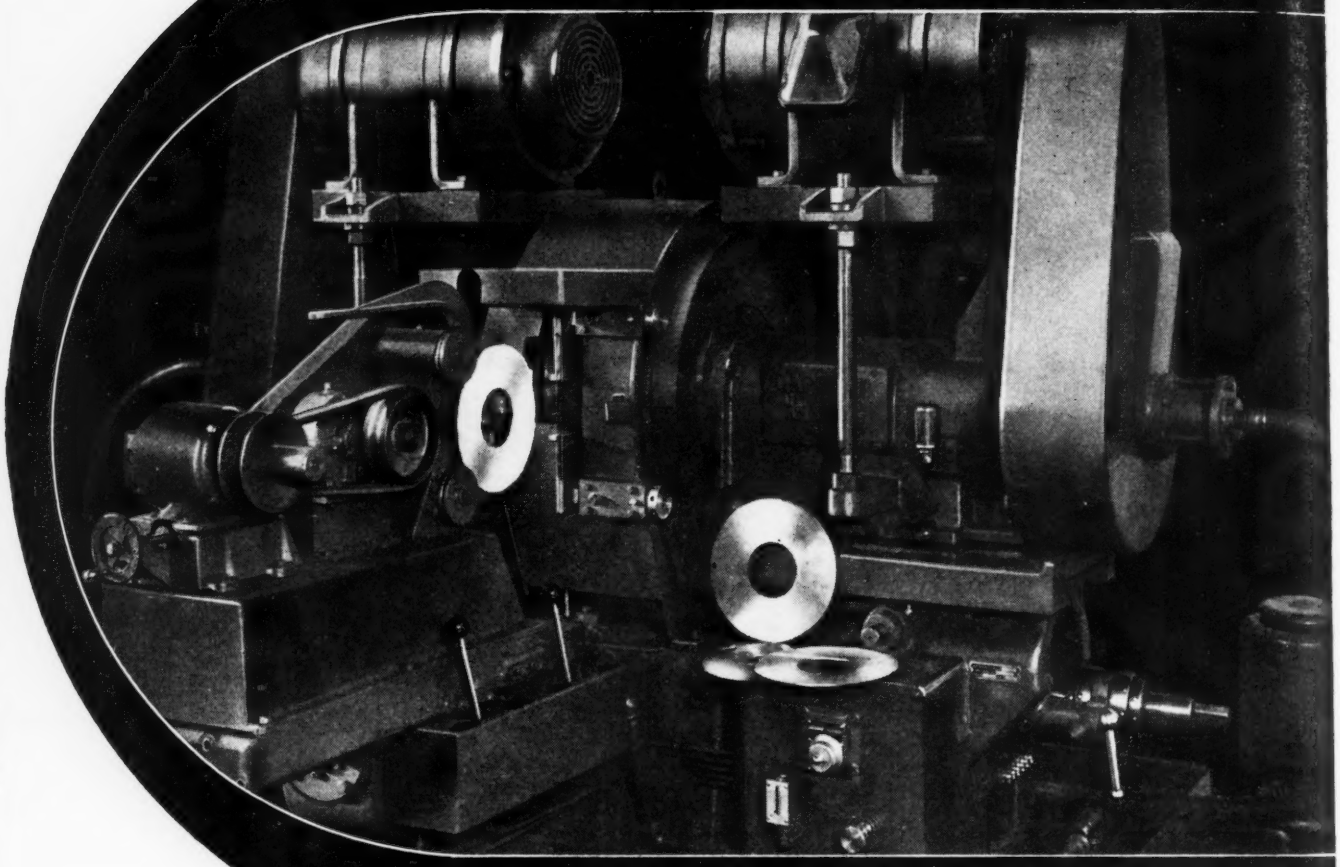


GARDNER-GROUND

THIS *new* Gardner development opens up a new field for *thin*, parallel-surface work requiring close accuracies.

The spring-steel automobile clutch plate seen here, measures 10⅝" O.D. by 4⅛" I.D. by .055" thick — too thin to be fixtured by conventional Double Disc Grinding methods. The large area involved, necessitates rotating the plate mechanically, rather than relying upon the spinning action caused by the opposed grinding wheels, which was standard practice in the past.

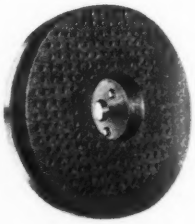
This Gardner No. 120A-26" Double Grinder carries an hydraulically-operated work table, mounted on a stationary knee. Two driven groove-type rollers contact the O.D. of the clutch plate, while a small straight roller contacts the I.D. under spring pressure, holding it into the driving rollers. Positive rotation and resulting close accuracy are assured.

PRODUCTION: 20 to 25 pieces per hour.

TOLERANCES: .002" for parallelism. .004" for uniformity.

STOCK REMOVAL: .020" maximum overall.

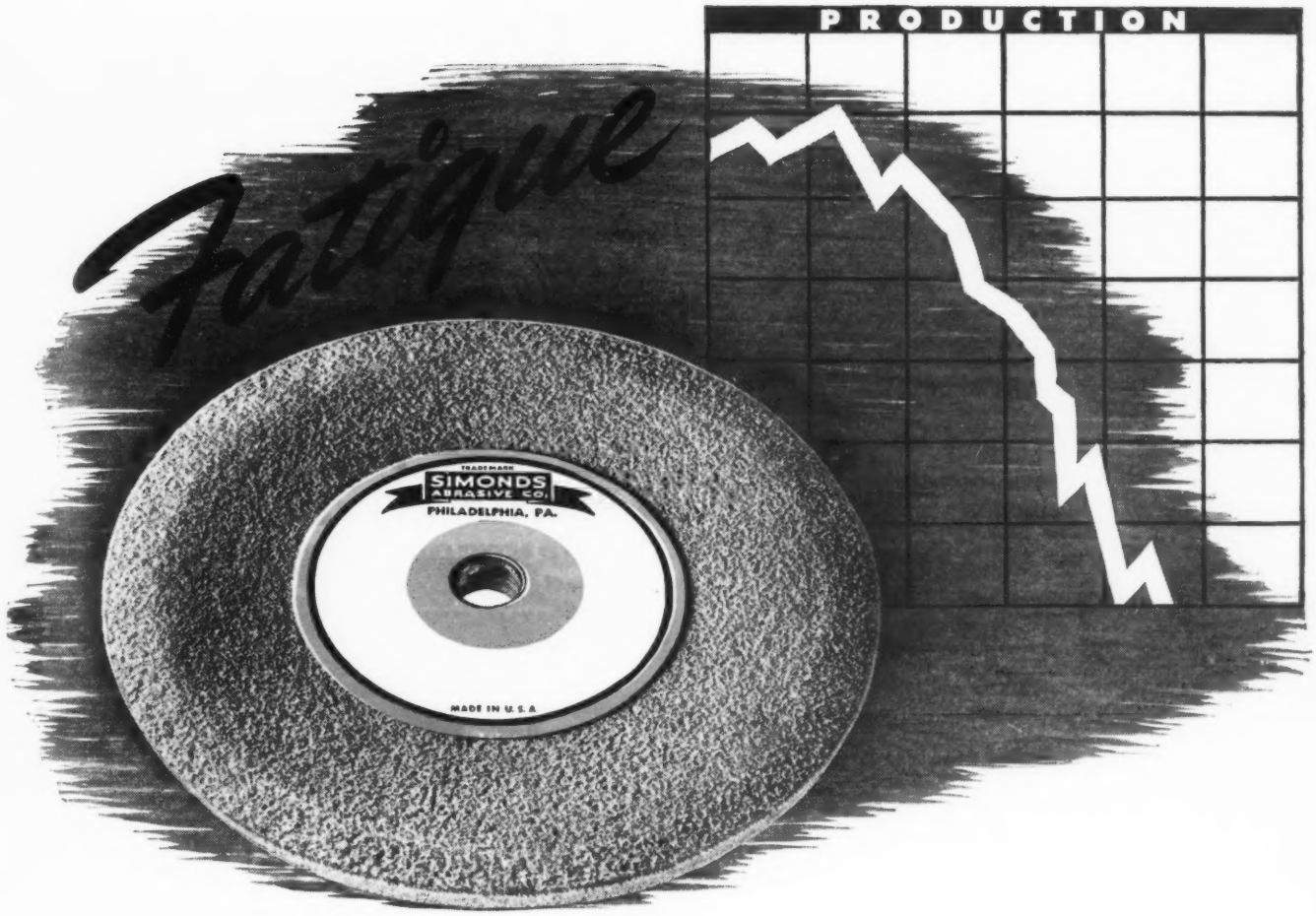
Use Modern GARDNER WIRE-LOKT Abrasives on YOUR Disc Grinders!



GARDNER-GRIND YOUR *Flat* SURFACES

GARDNER MACHINE COMPANY

414 East Gardner Street · · · · Beloit, Wisconsin, U.S.A.



can cause a drooping production curve

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Other affiliated Companies:

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Select from Simonds Abrasive Company's line of Borolon* (aluminum oxide) and Electrolon* (silicon carbide) Grinding Wheels and you take the first step toward eliminating production-robbing fatigue. Fatigue in metal through improper grinding . . . fatigue of the grinding wheel from using the wrong abrasive combination . . . fatigue of the operator trying to force the wrong wheel to cut right . . . fatigue of the grinding machine through uneven wear and stress from out of balance wheels. Guard against this costly factor with efficient wheel selection.

Select the right wheels from all the shapes and sizes in the Simonds Abrasive line. Select the correct grain, grade, structure and bond from these precision manufactured, scientifically tested grinding wheels. Select with assurance of getting time-proven abrasive products for top grinding performance. Large stocks meet all your needs promptly, efficiently. In addition to the help of Simonds Abrasive Distributors, the Simonds Abrasive Data Book is a valuable guide to proper selection. Write for yours today.

SIMONDS ABRASIVE CO.

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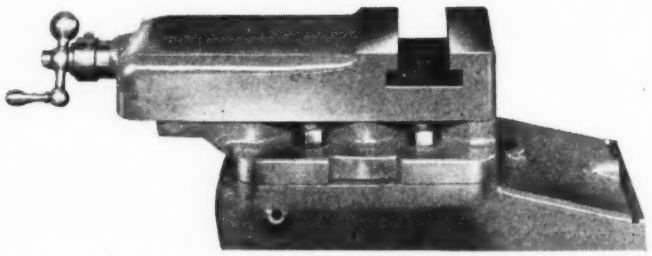
Springfield Tool Room Lathes

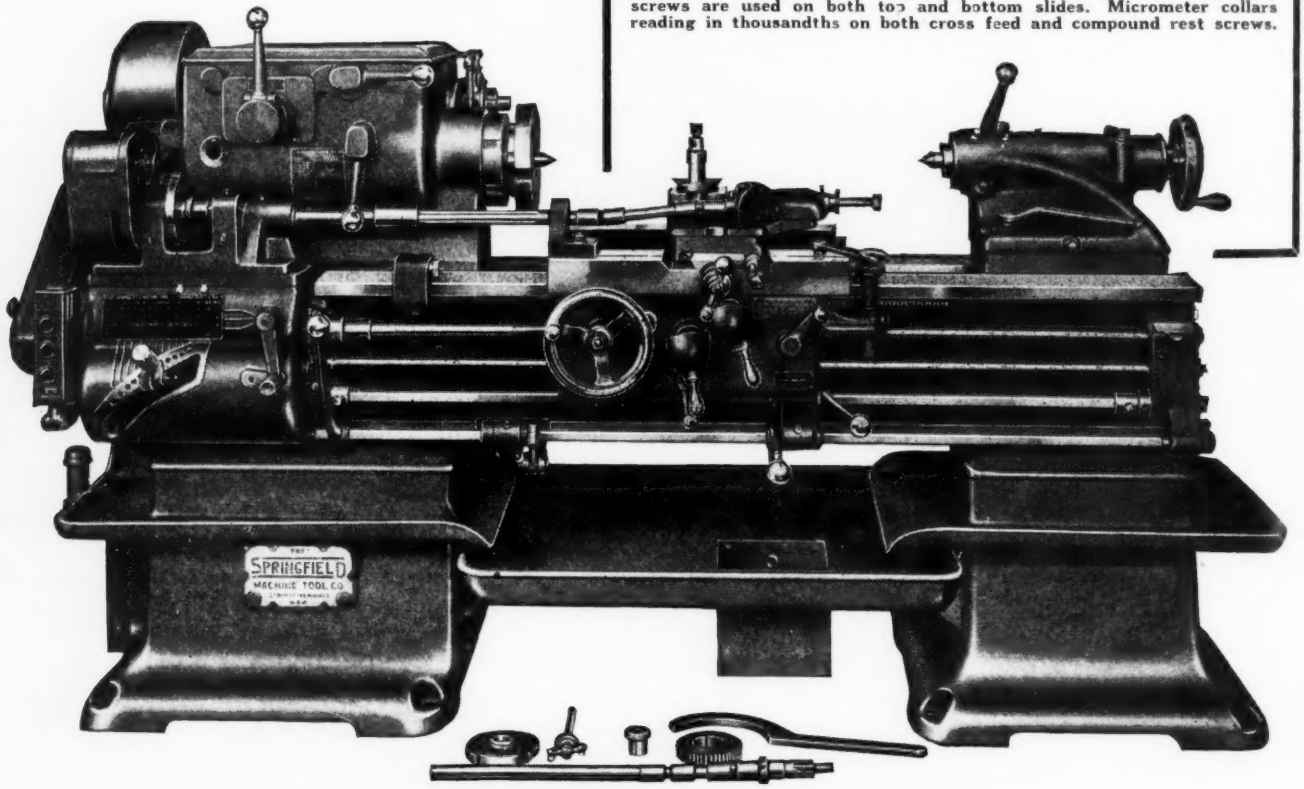
Even on the heaviest work, Springfield Lathes will produce precision work now and for years to come. The deep, well-ribbed bed is cast in our own foundry of High Test Nickel Chrome Gray Iron. Wide gears and heavy shafts are used, with Timken, ball and bronze bearings throughout. Powerful headstock, massive tailstock, rugged compound rest—all contribute to greater accuracy throughout a wider range of work . . . and throughout the life of the lathe. Profitable production today demands a lathe able to machine all the new, tough alloys, using modern cutting tools and taking advantage of faster feeds and speeds. Choose Springfield Lathes and invest in accuracy and production—now and for a long time to come.

MAXIMUM CAPACITY *Plus* LASTING ACCURACY

COMPOUND REST:



Compound Rest is a heavy duty square base type having no overhang and featuring a full 360° swivel for angular work. Four bolts are used to prevent turning when taking heavy cuts. Taper gibs with adjusting screws are used on both top and bottom slides. Micrometer collars reading in thousandths on both cross feed and compound rest screws.



SEND TODAY FOR BULLETIN NO. 162

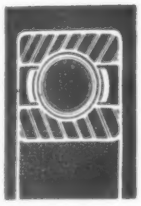
THE SPRINGFIELD MACHINE TOOL CO.
SPRINGFIELD, OHIO

BEARING FACTS NO. 2

The Single Row Ball Bearing

ITS USE AND ADVANTAGES

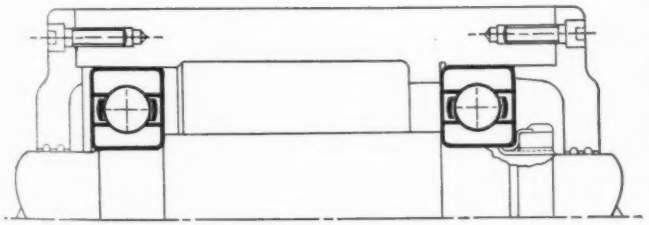
AS PRODUCED BY NORMA-HOFFMANN



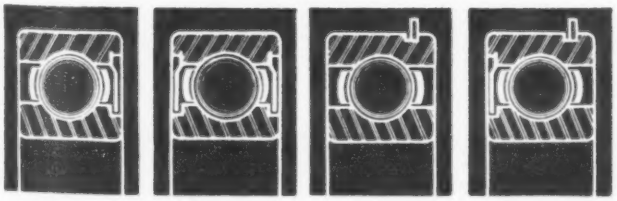
DEEP GROOVE NON-FILLING SLOT TYPE

This is the most widely used type of all anti-friction bearings. It can carry both radial and comparatively heavy thrust loads. Its uninterrupted, symmetrical raceways and self-contained, deep-groove design give it a wide range of application. Special types are available with ultra-precision tolerances. Here are some of its advantages:

- Self-contained. Can be handled and mounted as a complete unit.
- Has equal thrust capacity in either direction.
- Close conformity of raceway with ball contour provides maximum load support.
- No adjustment. Bearings delivered with required internal clearance.



- In two-bearing applications (as above) one bearing can be locked in the housing, the other "floated." This allows for expansion due to temperature changes and compensates for variables in machining shaft and housing shoulders.



SINGLE & DOUBLE SHIELDED

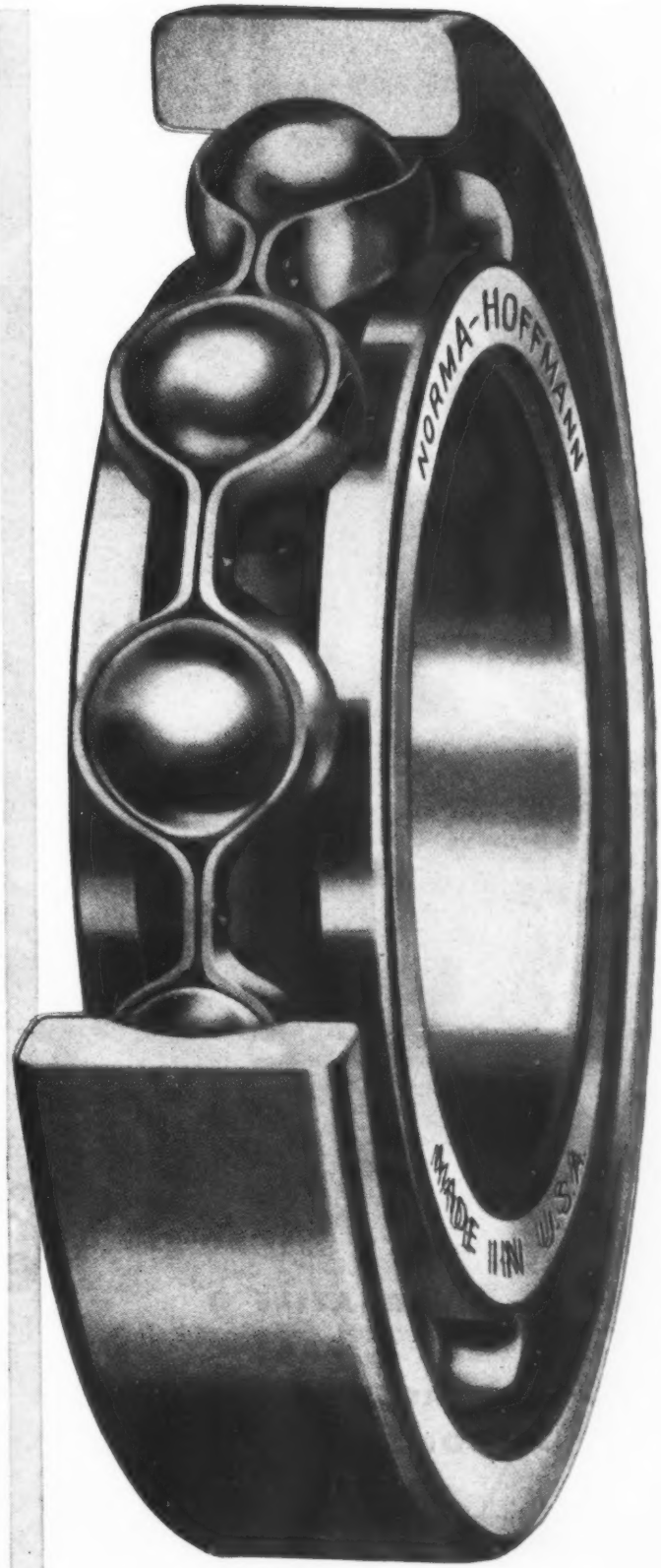
The side plates are fixed in outer ring and extend into recess of inner ring forming labyrinth to retain grease, exclude dirt.

1. Provides economical closure for many ordinary uses.
2. Supplements other seals for extra dirty applications.
3. Occupies no greater space than standard single row bearing.
4. Ex packed with Norma "Stability-Tested" Grease; long service without relubrication is assured.

SHOULDER (SNAP) RING TYPE

This bearing is equipped with a split metal locating ring which is snapped into a groove in the outer ring of the bearing.

1. Self-locating; no need for providing machined housing shoulders.
2. Permits simplest housing: a straight through bore.
3. Provides longitudinal compactness with saving of materials and weight.



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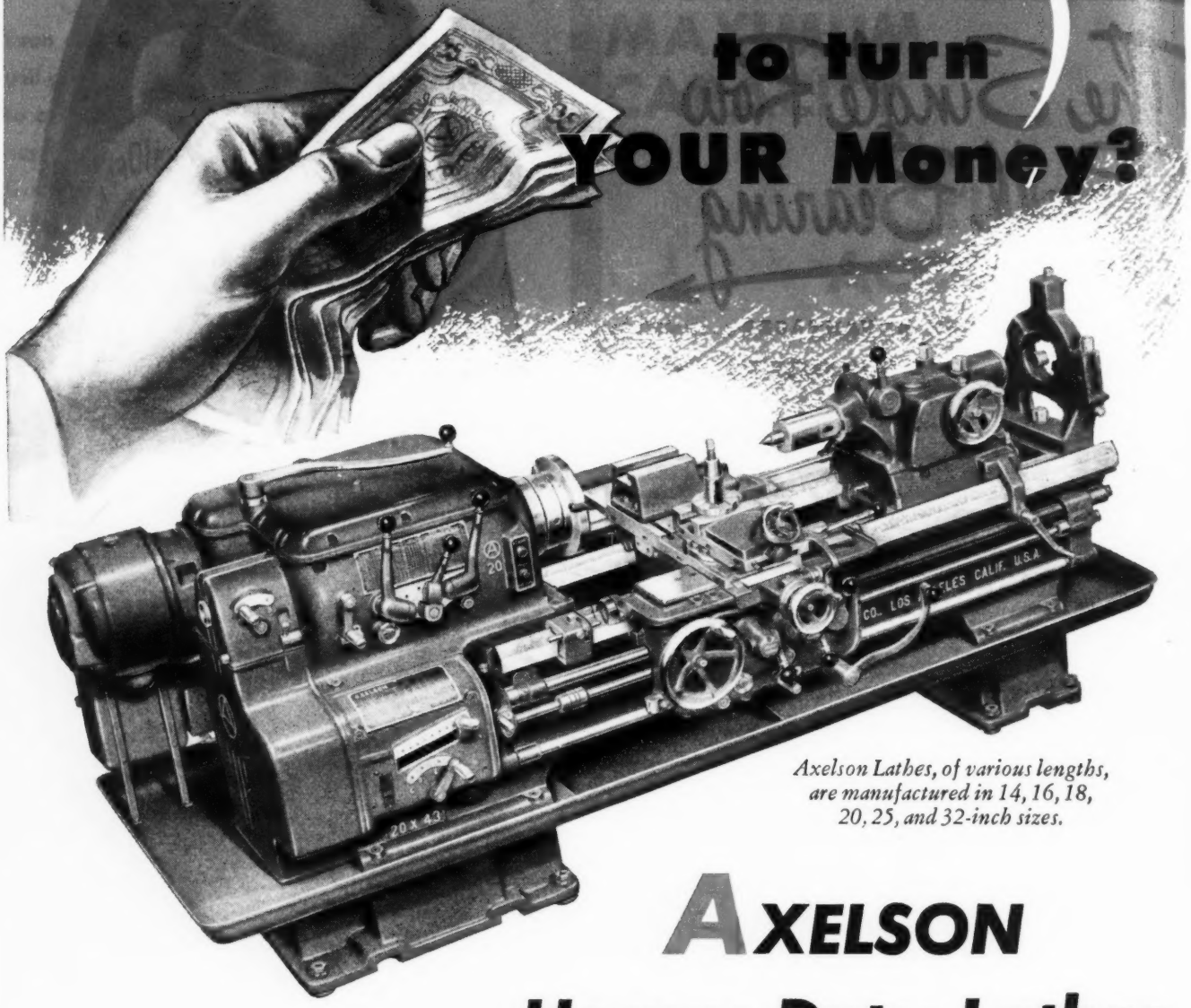

Axelson Lathes, of various lengths, are manufactured in 14, 16, 18, 20, 25, and 32-inch sizes.

AXELSON Heavy Duty Lathes

VERSATILE
FAST
ACCURATE
LONG LIVED

have been turning money for machine shop operators everywhere, for more than thirty years . . . "Quality First" has always been the Axelson manufacturing tradition.

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THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

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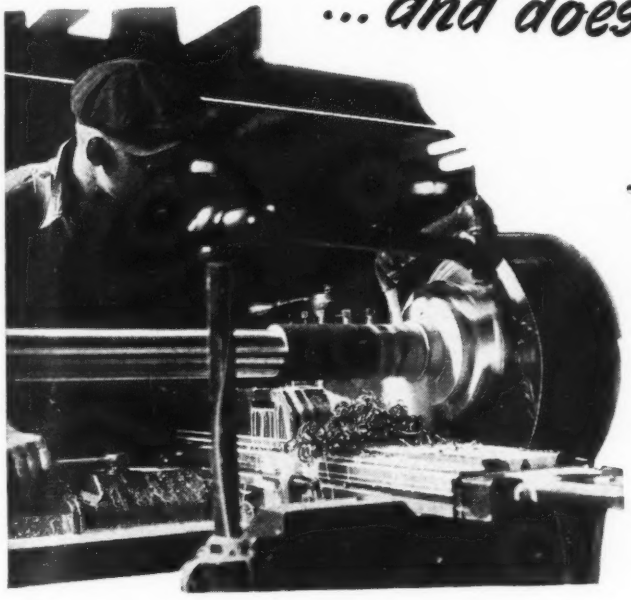
DUAL-PURPOSE OIL FOR CUTTING AND LUBRICATION

"Does the work of Two Oils ... and does it BETTER!"



"Increases speed..."
"Prolongs tool life..."
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Yes . . . operators and lubrication engineers agree that Tycol 650 Series Dual-Purpose Oil is the *one* oil for both cutting and machine lubrication that gives better results *both* ways.

Get in touch with your nearest Tide Water Associated Office today for full details.

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The simplified design of the Namco RST Collapsible Tap, with its circular ground thread chasers, guarantees both speed and accuracy.

Collapsing action at end of cut is quick and positive. Hardened and ground throughout, for precision and long life.

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To use as a revolving tap, simply remove handle—this double-duty feature saves tool investment.

Here is an important production tool—a money saver for your shop. Capacities 3″ to 5″. Catalog B-42-C gives full details.

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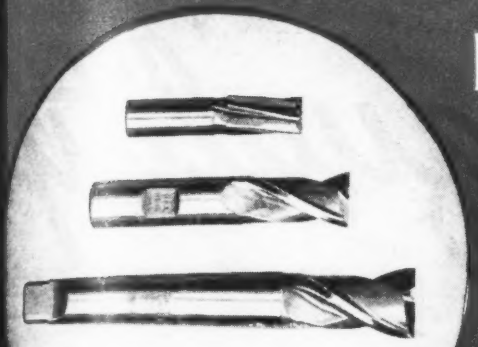
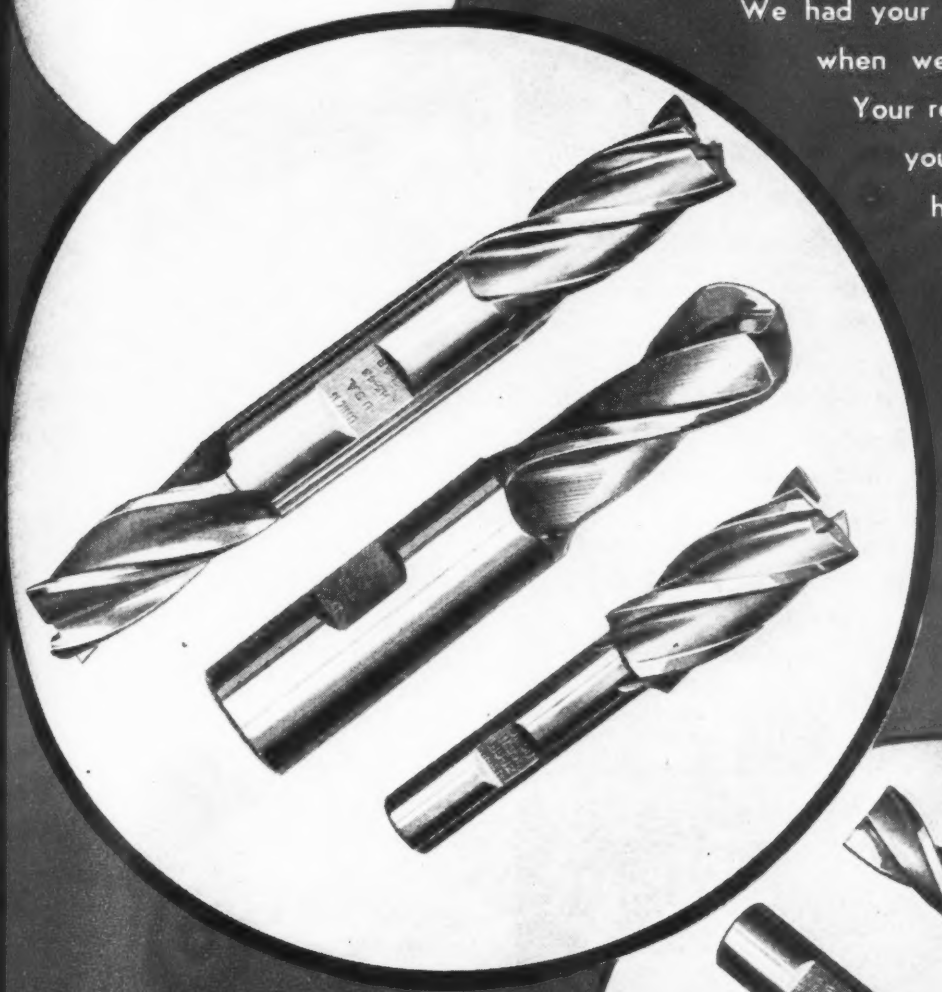
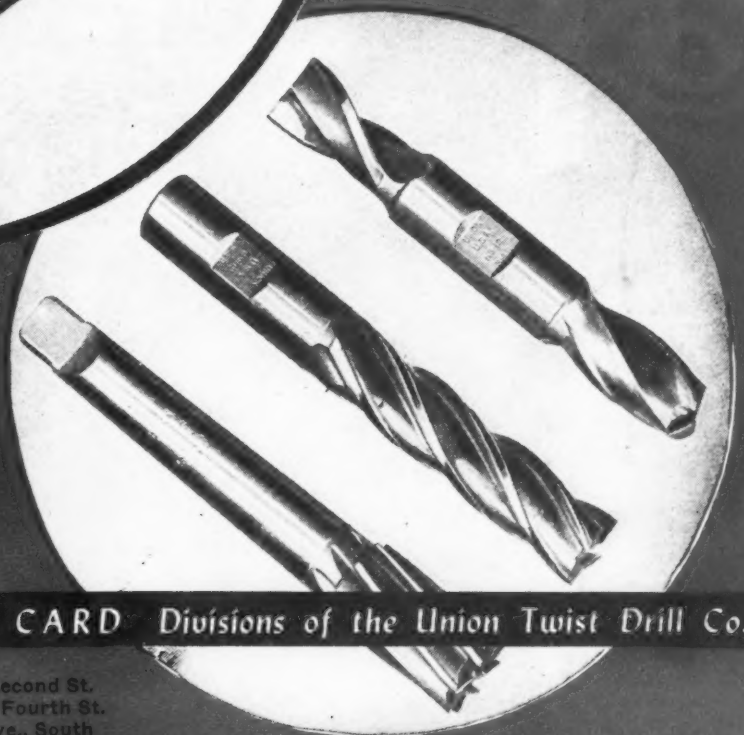
Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

Perfected for Production ...by UNION



We had your production in mind
when we perfected Union Tools.
Your requirements – and
your practical shop experiences
have helped us
design tools which will
give you better results...
consistent
high accuracy,
consistent low costs.
Keep your production
curve rising! Union –
The Tools You Buy Again –
will help you do it.





UNION TWIST DRILL CO.
ATHOL MASS.

S. W. Card Mfg. Co. Div.—Mansfield, Mass.
Butterfield Div., Derby Line, Vt.
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UNION ★ BUTTERFIELD ★ CARD *Divisions of the Union Twist Drill Co.*

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get CARD quality

Get Card Quality when you order taps . . . and be sure of consistent quality results on all your tapping jobs. Card stamina, Card accuracy, Card quality have been proved again and again on every type of tapping operation . . . proved by service for over 70 years!

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HIGH QUANTITY PRODUCTION

For results that rate high—in quantity as well as quality—specify Butterfields! Typical of the complete line of Taps and Reamers for every type of job, the high production tools illustrated are designed from tip to shank to make work profitable, accurate and economical. For the tough jobs . . . for the accurate jobs . . . for the fussy jobs—specify Butterfields!

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AGD SPECIFICATIONS THROUGHOUT

Made in 42 Models including 4 Dial Diameters, 7 Different Graduations, 90° Models (stem perpendicular to back), Long Range and Long Stem Types.

*Patents Pending

For Especially Fine Checking

EXTRA HIGH REPEATABILITY
MARKED IN DECIMALS
NO WHIP, NO WAVER OF HAND
AGD MOUNTING DIMENSIONS

Made in 19 Models including 4 Dial Diameters and 8 Different Graduations.

STANDARD SHOCKPROOF MECHANISM

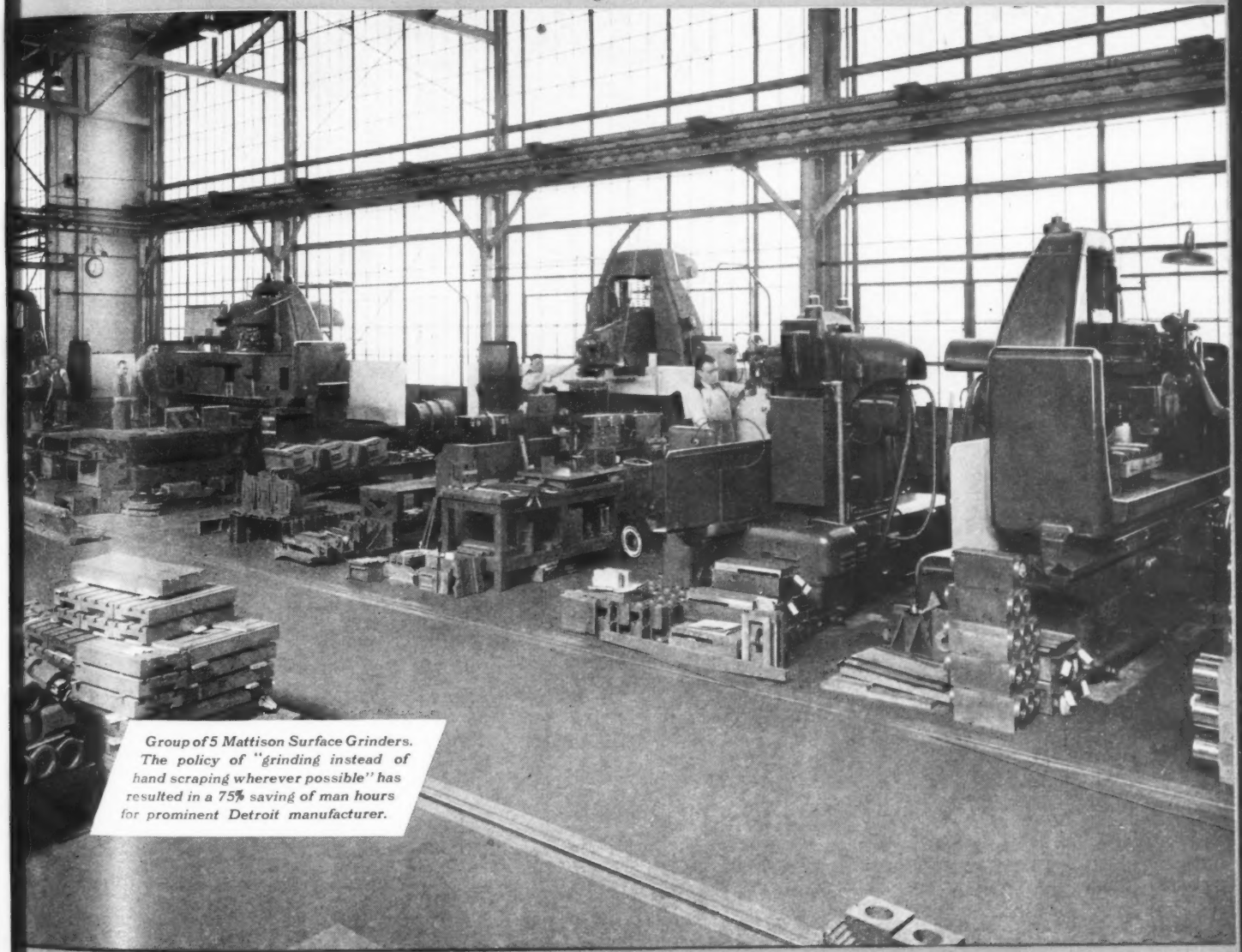
Used in practically all models. Guards the instrument against sudden application of the work piece; assures long life and continuing accuracy. It is a **fully** shockproof mechanism which protects all delicate parts from stem to indicating hand.

Write for Special Bulletin

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.

ROCKFORD Metalworking Production Ideas

October, 1946



Group of 5 Mattison Surface Grinders. The policy of "grinding instead of hand scraping wherever possible" has resulted in a 75% saving of man hours for prominent Detroit manufacturer.

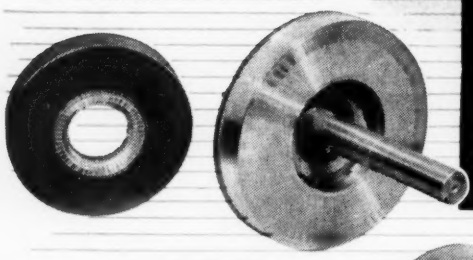
AMERICAN BROACH & MACHINE CO. ★ ANDERSON BROS. MFG. CO. ★ BARBER-COLMAN COMPANY
Div. of Sundstrand Machine Tool Company

BARNES DRILL CO. ★ JOHN S. BARNES CORP. ★ W. F. & JOHN BARNES CO.

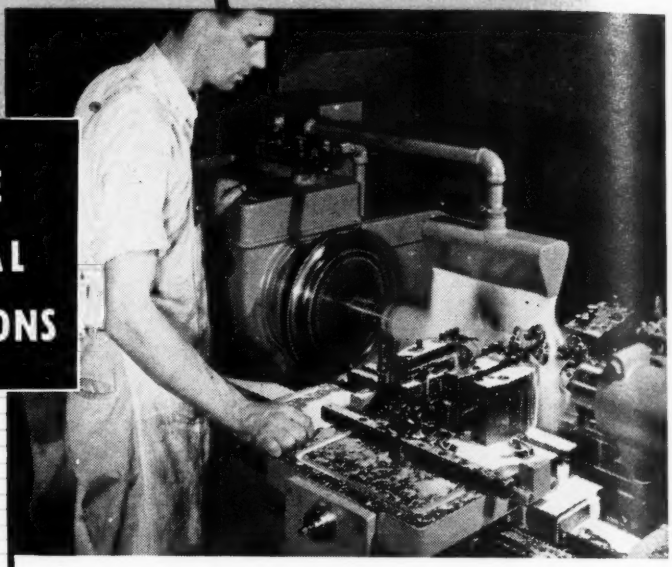
GREENLEE BROS. & CO. ★ MATTISON MACHINE WORKS ★ REHNBERG-JACOBSON MFG. CO.

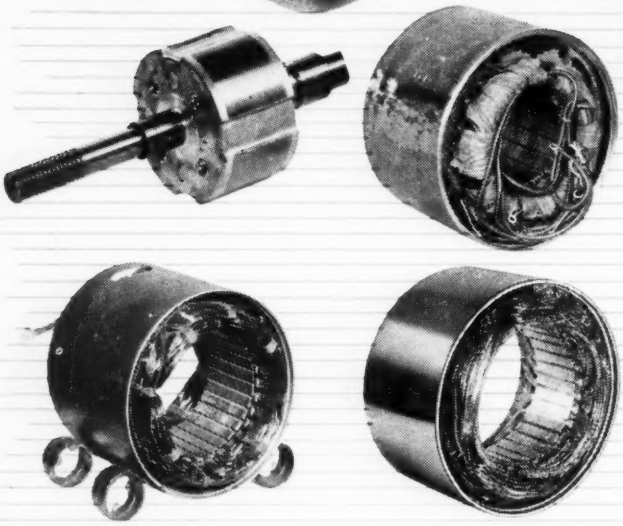
ROCKFORD CLUTCH DIVISION ★ ROCKFORD MACHINE TOOL CO. ★ SUNDSTRAND MACHINE TOOL CO.
Borg-Warner Corporation

how to improve MACHINING METHODS for ELECTRIC MOTOR PARTS with SUNDSTRAND "ENGINEERED" PRODUCTION



THREE TYPICAL OPERATIONS

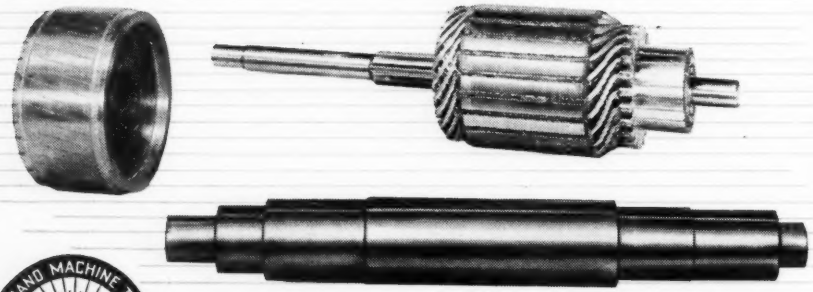




1 — TURNING SHAFTS . . .

Rough and finish multple tool turning both ends of motor shafts in four operations. Shafts come cut to length and centered. Sundstrand automatic lathes completely turn twelve different sizes of motor shafts. Carbide tools, multiple tooling and automatic cycling increase production over the single tool lathes previously used for this work. Operator's only duties are to load and unload parts and start the automatic machine cycle.

Illustration is of tooling setup for rough turning operation on one end.



Motor frames, commutator assemblies, armature assemblies, rotors, shafts, etc., all turned on Sundstrand automatic lathes. Parts are turned in both long and short runs.

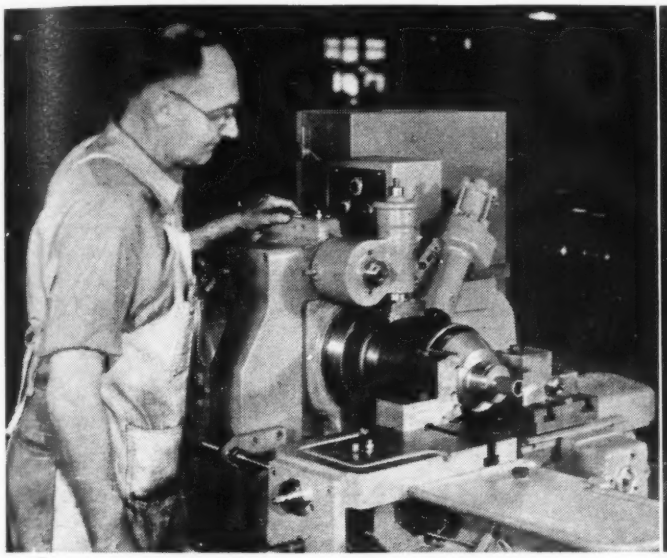
SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A. ·

RIGIDMILS | FLUID-SCREW RIGIDMILS | AUTOMATIC LATHES | HYDRAULIC EQUIPMENT

MADE IN ROCKFORD... TESTED ENGINEERING AND CRAFTSMANSHIP

ILLINOIS, U.S.A.

HERE'S an interesting example of Sundstrand "Engineered" Production as applied to the manufacturing of electric motors. These motor components vary in size and operations required. Each is machined on Sundstrand equipment with a method best suited to the production requirements of the plant in which the machines are installed. If you manufacture electric motors of any type, our engineers have had practical experience which may prove helpful in improving your machining methods. Call on them without obligation.



2 — TURNING RABBET FITS . . .

This standard Sundstrand automatic lathe bores the inside diameter of both ends, chamfers the inside diameter and outside diameter of both ends and faces the ends of a stator frame and coil assembly. Eight tools are used to complete the operation in one machine cycle. Machine and tool adjustments enable this equipment to be used on a number of different sizes of parts.

3 — TURNING, FACING AND SHAVING ARMATURE ASSEMBLIES

This Sundstrand is equipped with four tool slides . . . two front, one rear and one overhead. Operator's duties consist only of loading, unloading part and starting machine cycle. The tool slides automatically rapid approach, feed, rapid return and stop. The four T. C. tipped tools turn the laminations, face off the end of the windings and shave. Several different sizes of parts are handled on this machine.

FREE

This booklet contains useful turning information on a wide variety of parts and materials. A study of these modern tooling methods may reveal profitable methods for you. Write for your copy today. Ask for bulletin No. 653.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD ILLINOIS U.S.A.

SUNDSTRAND
MACHINE TOOL COMPANY

2530 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES **SPECIAL MILLING AND TURNING MACHINES**

MADE IN
FOR RIGID ACCURACY IN MACHINE TOOLS...ROCKFORD
ILLINOIS, U.S.A.

Hy-Draulic

4610

ROCKFORD Hy-Draulic MACHINE TOOLS

Over sixteen years ago the Rockford Machine Tool Co. introduced the first hydraulic reciprocating machine tool. Today our belief in the superiority of hydraulic design stands justified, for Rockford Hy-Draulic Machine Tools have proved themselves wherever and however employed. The exclusive and highly specialized engineering experience that has been ours is fully applied in each machine tool we build.

Every Rockford Hy-Draulic Machine Tool offers such basic advantages as:

1. Ease of control for quick set-up and fast operation.
2. Stepless Speeds . . . infinitely adjustable throughout a wide specified range. Hy-Draulic tool-head feeds similarly adjustable.
3. Efficient, smooth hydraulic pressure . . . maintains cutting speed as set, no matter how work resistances vary.
4. Smooth, fast reversals and high return-stroke ratios. Oil flow through Hy-Draulic System reverses instantly. Simplicity of Hy-Draulic System holds inertia factors to a minimum.
5. Fine finish and long tool life. Smoothness of Hy-Draulic drive, free of mechanical play and vibration, protects work and cutter.

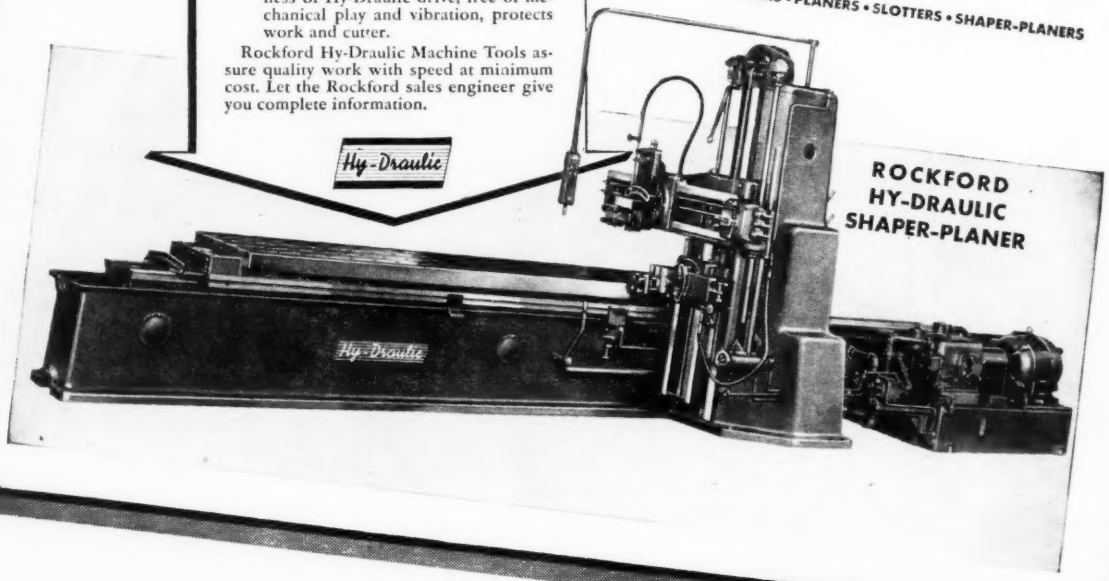
Rockford Hy-Draulic Machine Tools assure quality work with speed at minimum cost. Let the Rockford sales engineer give you complete information.

Hy-Draulic

speed plus smooth power

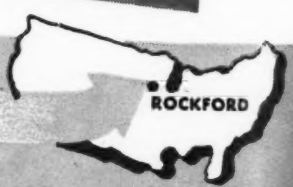
Rockford Hy-Draulic Shaper-Planers provide the operating speed and ease of control for doing the job fast. Rugged construction and smooth hydraulic drive assure quality work whatever the type of cut. Illustrated above is a Shaper-Planer in use at the Universal Engineering Corporation plant, Cedar Rapids, Iowa. Manufacturers of rock and gravel crushers and related equipment, Universal has found the Shaper-Planer a highly productive machine for a wide variety of work; a typical application is shown here, where a rough cut is being made on a cast steel pitman to a depth of 1/2" at a 3/32" feed. Work such as this is performed quickly because cutting and return stroke speeds are high, infinitely adjustable, and may be independently set as desired. Rockford Hy-Draulic Shaper-Planers are built in five sizes with rated stroke lengths from 42" to 144". For complete information write for Bulletin 1538.

ROCKFORD MACHINE TOOL CO.
ROCKFORD, ILLINOIS
SHAPERS • PLANERS • SLOTTERS • SHAPER-PLANERS



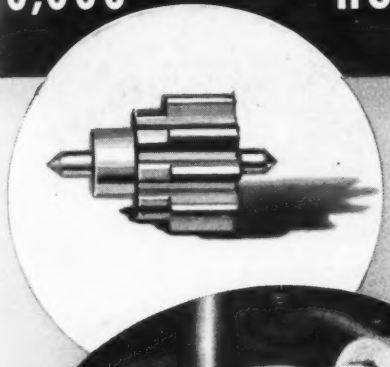
ROCKFORD HY-DRAULIC SHAPER-PLANER

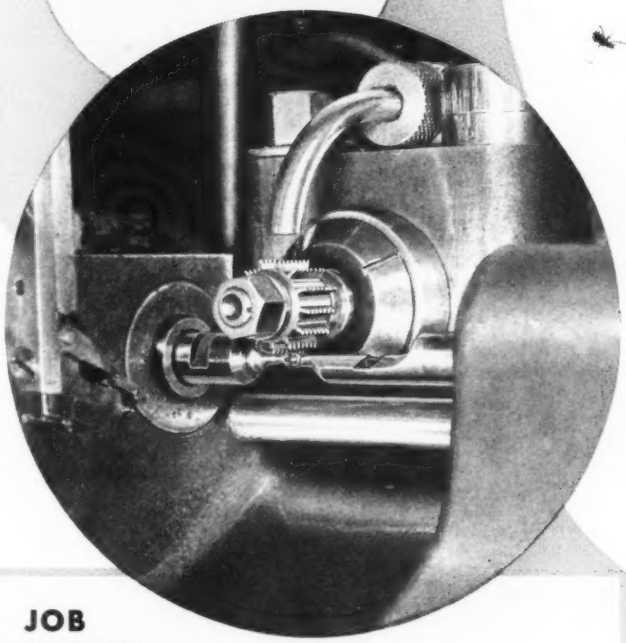
MADE IN ROCKFORD... FOR MACHINES DESIGNED TO SUIT YOUR PRODUCTION
ILLINOIS, U. S. A.



143 pieces per HOUR
2,500 " " GRIND
30,000 " " HOB

in FINE PITCH PRECISION PINION PRODUCTION





B-C TYPE S AUTOMATIC HOBBING MACHINE CONSISTENTLY GIVES HIGH ACCURACY . . . AND SUPERIOR FINISH ON LONG RUNS

At this plant, where 73 Barber-Colman Type S Automatic Hobbing Machines are used to hob small precision pinions and gears, extremely high accuracy is being consistently combined with increased hob life and *high production.*

These 9 tooth .0481″ circular pitch steel pinions, with .1039″ face width, are finish hobbed in 25 seconds. B-C small fine pitch topping hobs are used, and runout is held to .001″ full indicator reading . . . allowable eccentricity between O. D. and pinion pivot is .0005″ diameter measured over three teeth is .1541 $^{+.0000''}_{-.0015}$.

AUTOMATIC CYCLE . . . MAGAZINE LOADING

High speed continuous hobbing of precision small gears and pinions, up to 1″ diameter by ½″ face, is best performed on the Barber-Colman Type S Automatic Hobbing Machine. This machine is entirely automatic, and the work is fed to the work spindle from a magazine. It's easy to set up . . . the operator loads the magazine, and the machine does the rest. *This entire battery of 73 machines is tended by only nine (9) operators.*

A Barber-Colman representative will gladly tell you more about this *efficient* machine and its possibilities for economically producing small gears and pinions for your job. Ask him to call on you . . . no obligation, of course.

JOB RECORD

Name of Part — Clock Type Pinion
Material — WD 1112 Steel, soft
Operation — Top-Hobbing 9-tooth .0481″ circular pitch pinions, outside diameter .1578″, face width .1039″, pitch diameter .1378″
Hobbing Machine — Barber-Colman Type S Automatic Hobbing Machine
Hob — B-C Topping Hob, ¾″ O.D., ½″ face
Holding Method — Between centers, magazine loading
Speed — 928 r.p.m.
Production — 143 per hour (at 85% efficiency)
Pieces per Grind — 2500
Accuracy — Runout .001″ full indicator reading, diameter over 3 teeth .1541″ $^{+.0000''}_{-.0015}$, .0005″ allowable eccentricity between pinion pivots and O.D.

Write **FOR BULLETIN No. F-1474** . . . which gives more detailed information and specifications on the B-C Type S Automatic Hobbing Machine.

HOBBING MACHINES, HOBS, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

BARBER-COLMAN COMPANY

GENERAL OFFICES AND PLANT • 109 LOOMIS ST. • ROCKFORD, ILL., U.S.A.

BARBER B-C COLMAN

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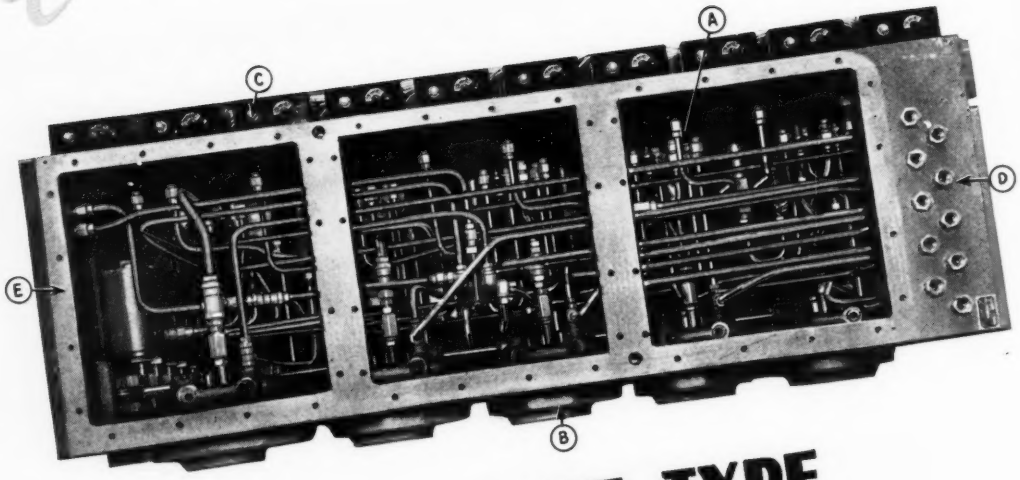
CENTER OF MACHINE TOOL EXCELLENCE... **ROCKFORD**
ILLINOIS, U.S.A.

The "INSIDE STORY"



BARNES UNIT-TYPE CIRCUITS

To you it's a story of economy and simplicity. It's simple because you obtain the complete machine function in a compact unit—designed, built, and tested by Barnes hydraulic experts to meet your exact requirements. As for economy—it represents a direct saving in machine design, assembly, and installation—plus the added long-range economy in operation and maintenance insured by Barnes efficient, trouble-free hydraulic elements.

This, then, is the inside story of the benefits you may obtain from this single-purpose unit-type hydraulic design.

Write today for new Hydraulic Unit Bulletin 301-U

Exclusive Barnes Features

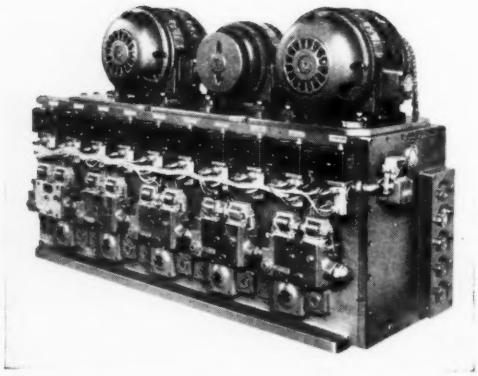
A. Guaranteed hydraulic actuating circuit completely piped and assembled within a single compact unit.

B. Five Barnes combination pump panels mounted on the reservoir unit.

C. Mounting space for standard Barnes valve and control elements.

D. External piping reduced to an absolute minimum; only the cylinder lines need to be connected.

E. Electric driving motors mounted on top of hydraulic unit.



LET BARNES SOLVE YOUR PROBLEMS

This complete hydraulic unit was designed by Barnes engineers for actuating a special turning machine. Five independent circuits are required for actuating this lathe, which performs one of the most difficult operations on automotive and aircraft crankshafts.

Our engineers are available for consultation on any hydraulic application. Your problem will receive their prompt and expert consideration.

John S. Barnes Corporation ROCKFORD, ILLINOIS

MADE IN
ROCKFORD... FOR ACCURATE, FAST METAL REMOVAL
ILLINOIS, U.S.A.

GREENLEE

SPECIAL MACHINE FOR FACING AXLE HOUSINGS AT 118 PIECES PER HOUR

There are several distinctive features about this new machine which are typical of Greenlee versatility in building special machinery. *First* is the automatic, power-indexing, three-sided turret with one station for loading two pieces, one working, and one unloading. Two operators handle the machine, one loading and the other unloading the two work pieces. *Second* is the manually controlled, air-operated fixtures for centering and clamping the work pieces. These pieces are "twisty", and are difficult to line up and hold accurately except by a carefully planned fixture arrangement of this kind. *Third* is the tooling, which employs both roughing and finishing tools working simultaneously. There are two spindles carrying cat-heads which are mounted on a single hydraulically operated feed unit. The tool bits are cross fed, with the finishing bit following the roughing bit. The production on this machine (118 pieces per hour at 80% efficiency) is typical of the results that are being obtained with Greenlee machines especially designed and built to meet production requirements and cut costs.

GREENLEE BROS. & CO.
1870 MASON AVE.
ROCKFORD, ILLINOIS

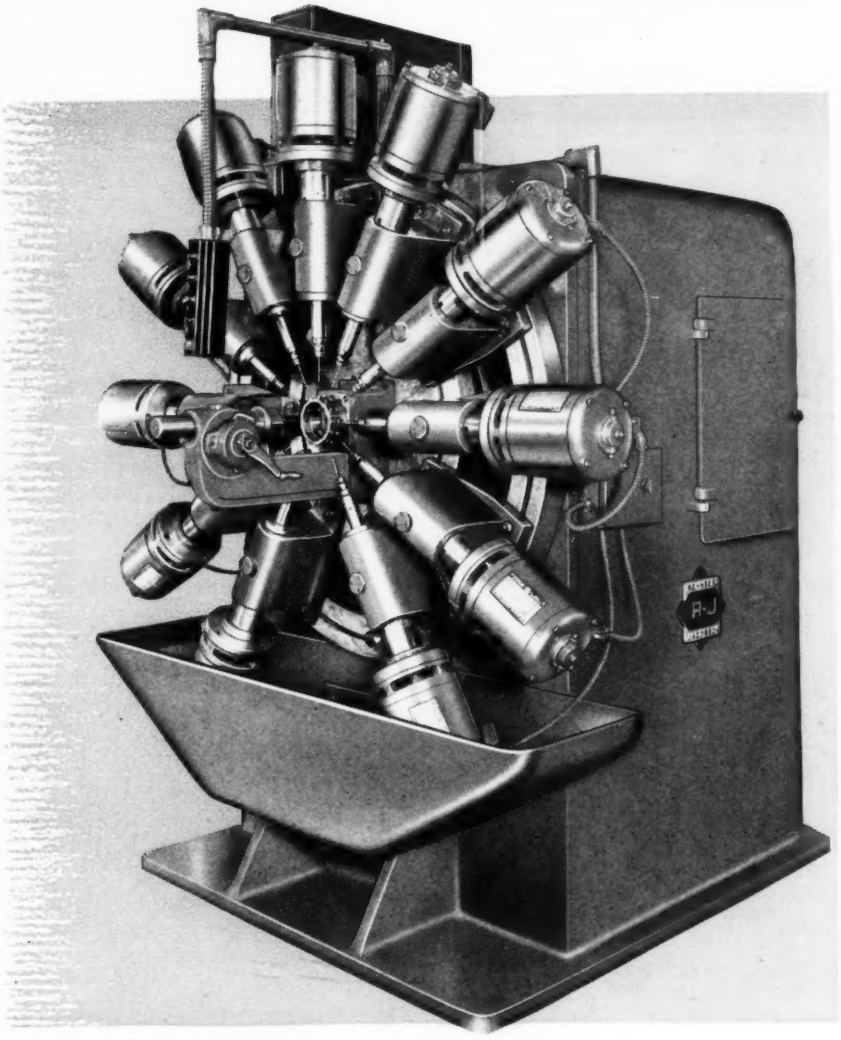
GREENLEE

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

MADE IN
YOU'LL FIND YOUR PRODUCTION MACHINE TOOLS IN...ROCKFORD
ILLINOIS, U.S.A.

Rehnberg-Jacobson

A NEW AND VERSATILE MACHINE FOR DRILLING PISTON SMOKE HOLES AT THE RATE OF 300 PIECES PER HOUR— ONE EVERY 12 SECONDS



The radially mounted drill units are fed simultaneously on this machine by an ingenious mechanism involving a large disk which actuates bell cranks geared to rack teeth in each spindle. The feed disk is moved by an air cylinder with an adjustable oil dashpot to control the rate of feed. (If air drive is undesirable, a motor-driven screw drive can be substituted.) The units are clamped into circular T-slots and thus can be easily and quickly repositioned for any change in smoke hole requirements. The machine shown is used in a plant where 10 different sizes of pistons, with 10, 11, and 12 smoke holes (certain of which must miss ribs), are being made in moderate runs. Interchangeable fixtures include built-in locators, drill bushings, and holding devices. A simple, fast-acting clamp enables the operator to maintain maximum production easily, especially since the machine is designed for most-convenient work-handling.

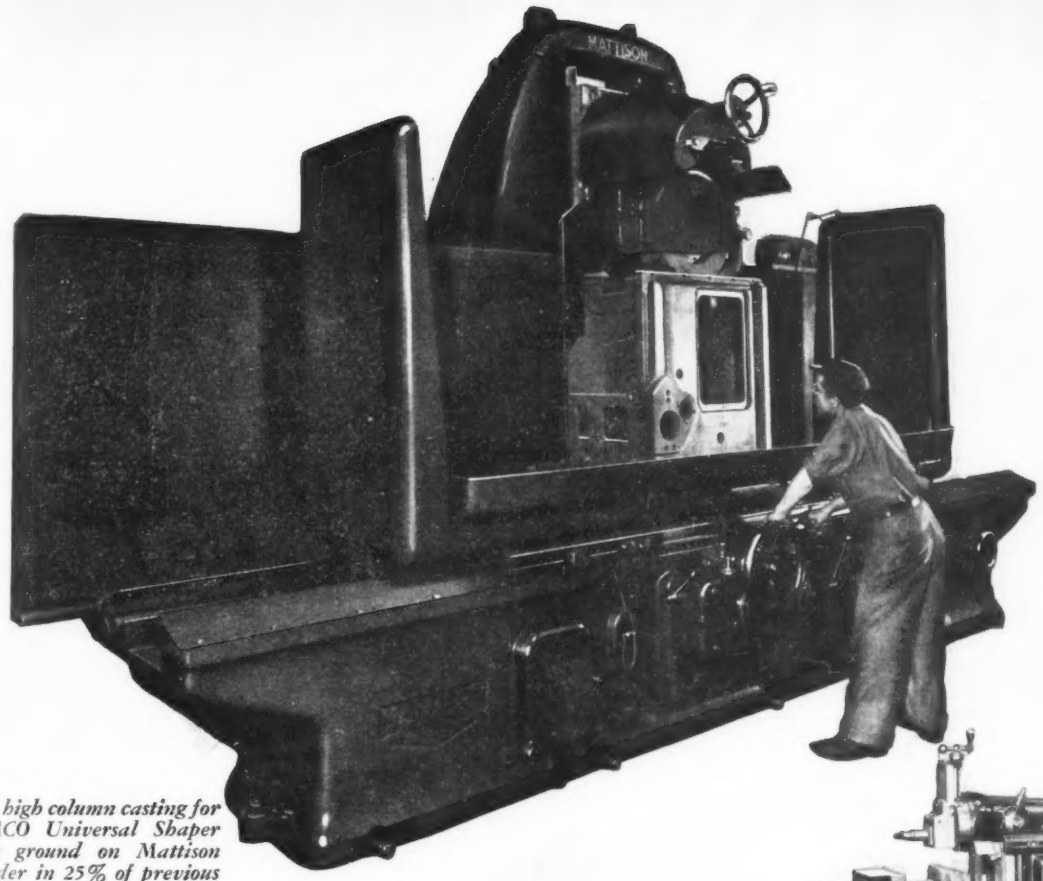
REHNBERG-JACOBSON MFG. COMPANY

DESIGNERS & BUILDERS OF SPECIAL MACHINERY

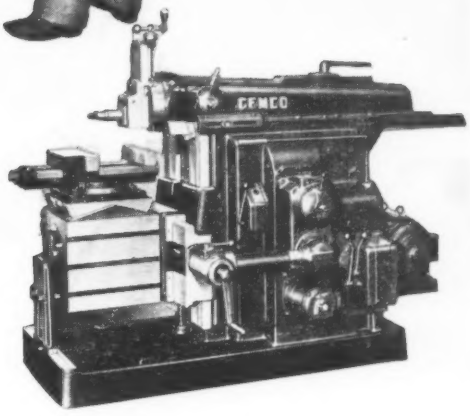
2135 KISHWAUKEE ST.
ROCKFORD, ILLINOIS

MADE IN
ROCKFORD...MACHINE TOOL SHOPPING CENTER
ILLINOIS, U.S.A.

PRECISION GROUND on MATTISON GRINDER in 1/4th the TIME OF PREVIOUS SCRAPING METHOD



33⅛" high column casting for GEMCO Universal Shaper being ground on Mattison Grinder in 25% of previous hand scraping time.



The Mattison Grinder job illustrated is a Column casting for a 24" GEMCO Universal Shaper.

The extra large capacity and the rugged, double column design of the Mattison Grinder permits easy handling of jobs like the one shown. GEMCO are doing this type of work in 25% of the time required by previous method of hand scraping. Large chuck capacity permits handling a greater number of small pieces at a time, with resultant savings up to 75%. The finish is excellent, with work being held to very close limits.

Parts ground include ram ways and vertical guides of the column, the ram, ram gibs, the tool head body, tool head slide and clapper box, the crossrail, all table surfaces and table support rail, the vise base, vise body and hardened jaws, crank block and crank plate.

The policy of grinding whenever possible pays off in lower costs, increased production and higher output.

Write for free Set-Up Book containing further examples showing how others have reduced time and cut costs with Mattison Grinders.

MATTISON MACHINE WORKS

ROCKFORD • ILLINOIS

MADE IN

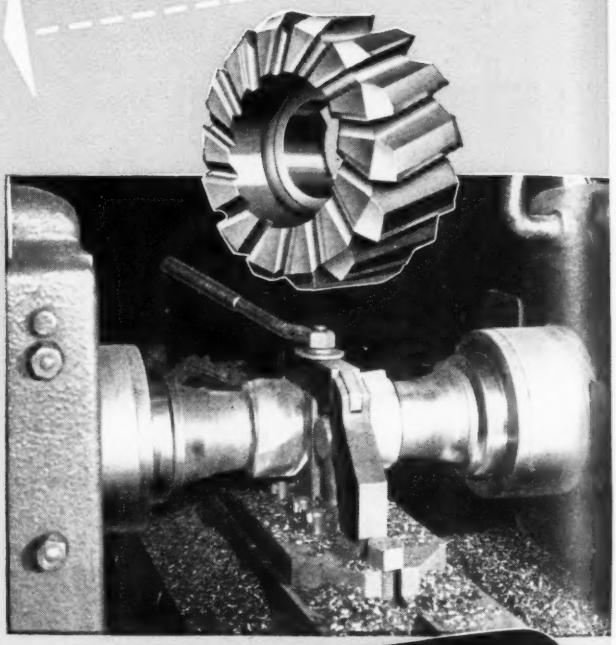
ROCKFORD MADE MEANS PRECISION MADE...ROCKFORD ILLINOIS, U.S.A.

1500 PIECES Per CUTTER GRIND

Barber-Colman

STANDARD SHELL END MILLS FACE 960 PIECES PER DAY

Two cast iron brackets, requiring a 1-1/2" facing cut and 1/8" stock removal, are milled *every 15 seconds* with Barber-Colman Standard Paraform Shell End Mills. Using a feed of 20" per minute and a speed of 436 surface feet per minute, these cutters produce 960 brackets per day. No coolant is used. 1500 pieces are milled for each cutter sharpening . . . exceptional tool life *typical* of all B-C Standard Milling Cutters.

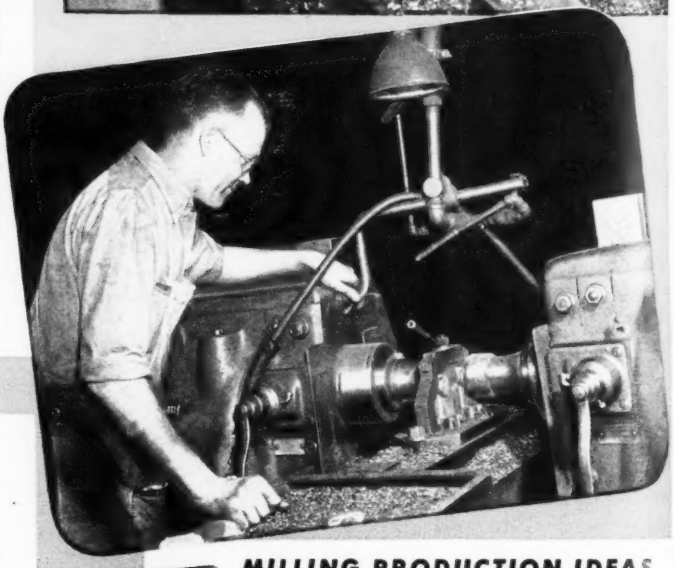


LOW TOOL COST . . . HIGH PRODUCTION ON FACE AND END MILLING OPERATIONS

Barber-Colman Standard Paraform Shell End Mills are designed for both face and end milling operations. They are accepted by industry for their high quality and extra long tool life. Careful selection of high speed cutter steel and advanced methods of *controlled* heat treatment permit maximum feeds and speeds . . . *peak production* and efficiency from the machine tool.

B-C Standard Paraform Shell End Mills are ready for immediate shipment from stock, with right hand cut, right hand spiral and left hand cut, left hand spiral . . . to fit all standard milling machine arbors. B-C can also furnish combination arbors and adaptors with standard No. 50 taper shank.

On your next face or end milling job, use B-C Standard Paraform Shell End Mills. You will secure larger production . . . at lower cost per piece milled.



CUTTER PERFORMANCE FACTS

Material — Cast Iron, medium hardness.
Operation — Face mill rocker arm brackets; dimension of cut — 1½"; stock removal — ⅛"
Machine — Cincinnati Milling Machine
Cutter — Two B-C Standard Paraform Shell End Mills, 4½" x 2¼"
Feed — 20" per minute
Speed — 370 r.p.m.
Surface Feet per Minute — 436
Cutting Time — 15 seconds (2 pieces)
Total Floor-to-Floor Time — 960 per day
Pieces per Grind — 1500

MILLING PRODUCTION IDEAS

Free Cutter performance jobs in the field, covering a wide variety of milling operations, are described in detail in this handy loose-leaf volume. Write for your copy of MILLING CUTTER DATA . . . sent to key production men, without obligation, when requested on company letterhead.

HOBBING MACHINES, HOBS, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

BARBER-COLMAN COMPANY

GENERAL OFFICES AND PLANT • 109 LOOMIS ST. • ROCKFORD, ILL., U.S.A.

BARBER B-C COLMAN

MADE IN

ROCKFORD...CITY OF MACHINE TOOL SPECIALISTS

ILLINOIS, U.S.A.

FOR BETTER FITTING AND Decreased Wear

BARNESDRIL No. 5E External Horizontal Honing Machine. Work is rotated and reciprocated while tool is held in a fixed position. Also shown is the BARNESDRIL Magnetic-Automatic Coolant Separator which removes the metallic particles from the coolant, assuring superior finish work.

EXTERNAL HONING Gives Extreme Accuracy for Uniformity and Superior Finish Accuracy for Taper Within .0001"

The Honing process not only generates finished surfaces in cylinder bores . . . but on EXTERNAL SURFACES of piston rods, shafting and tubing, the *external honing* process results in reduction to a minimum in wear on packing and provides a more perfect fitting to attain a higher peak of efficiency in products. In hydraulic assemblies, a better oil seal is provided through external honing.

External Honing . . . a precision production process . . . assures a high degree of accurate roundness and smoothness as well as straightness throughout the full length of the workpiece. Starting at the rough machined surface, honing cuts down to base metal quickly; then delicately completes final finish to a lustrous metal surface and establishes the required size precisely.

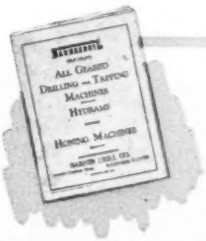
BARNESDRIL No. 5L *External* Straight Line Honing Machine of two-spindle construction. Work is held and rotated while tool is reciprocated.

Honing for Finer Finish . . . Greater Accuracy . . . Improved Products

Proper honing gives any desired surface finish. Tool marks, hills and valleys and grinder marks (from previous machining operations) are eliminated through honing . . . resulting in a uniform, superior surface.

There are BARNESDRIL Hydraulically-Operated Internal and External Honing Machines, available in vertical, horizontal or angular types, with one or more spindles. Easy and fast to operate, BARNESDRIL Honers will hone work up to 40" in diameter and more than 75' in length.

BARNESDRIL engineers can show you how to apply the honing process to your particular jobs for both internal and external surfaces. There is no obligation for this service.



HERE is complete data and information on the Honing process for Internal and External Surfaces. Write TODAY for your copy of Bulletin M-121.

814 CHESTNUT STREET

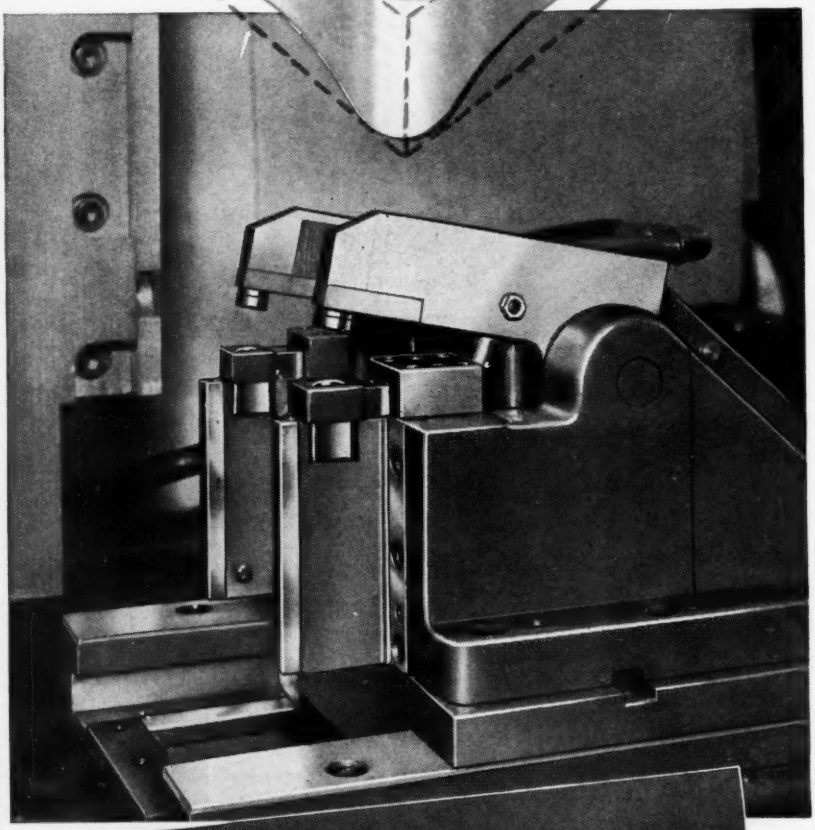
Barnes Drill Co. ROCKFORD ILLINOIS, U.S.A.

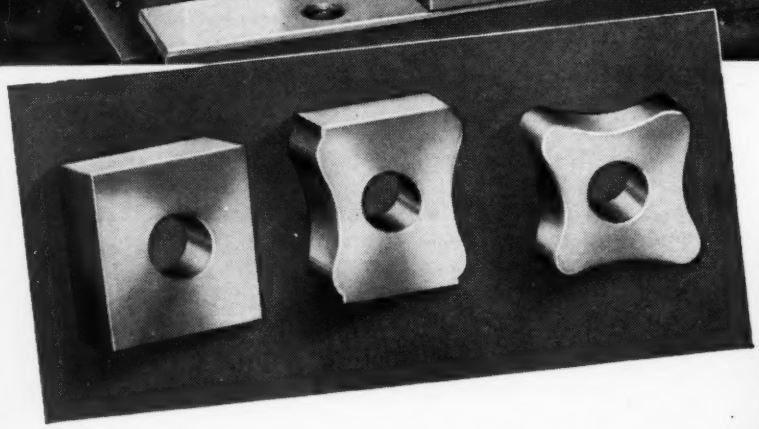
MADE IN

FOR PRODUCTION MACHINE TOOLS IT'S...ROCKFORD ILLINOIS, U.S.A.

RAPID CONTOUR BROACHING

...THE *American* WAY





Broaching the inner member of automotive pump rotors is typical of contour broaching jobs performed by *American* Broaching Machines. Using an *American* SB-42-10 ton Standard Vertical Hydraulic Single Ram Surface Broaching Machine, production is as high as 240 pieces per hour, allowing six seconds loading time.

For your contour broaching or metal finishing jobs, take advantage of *American's* complete broaching service—machines, tools, and engineering. *American* engineers will gladly help with such problems as tooling, fixture set-up, and, if necessary, the design of special equipment. Write *American* today for complete details.

Upper Photo: Fixtures of the American SB-42-10 Broaching Machine used for contour broaching inner rotor parts. Two opposite sides are broached at left hand position; two remaining sides are broached at right hand station. Hydraulic clamping is automatic. *Lower:* Inner rotor part in various stages of completion. At left is blank before broaching. Center piece has been broached on two sides only. Right-hand part is completely contour broached.

MEMBER BROACHING TOOL INSTITUTE

American BROACH AND MACHINE CO.

ANN ARBOR, MICHIGAN

•

BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY

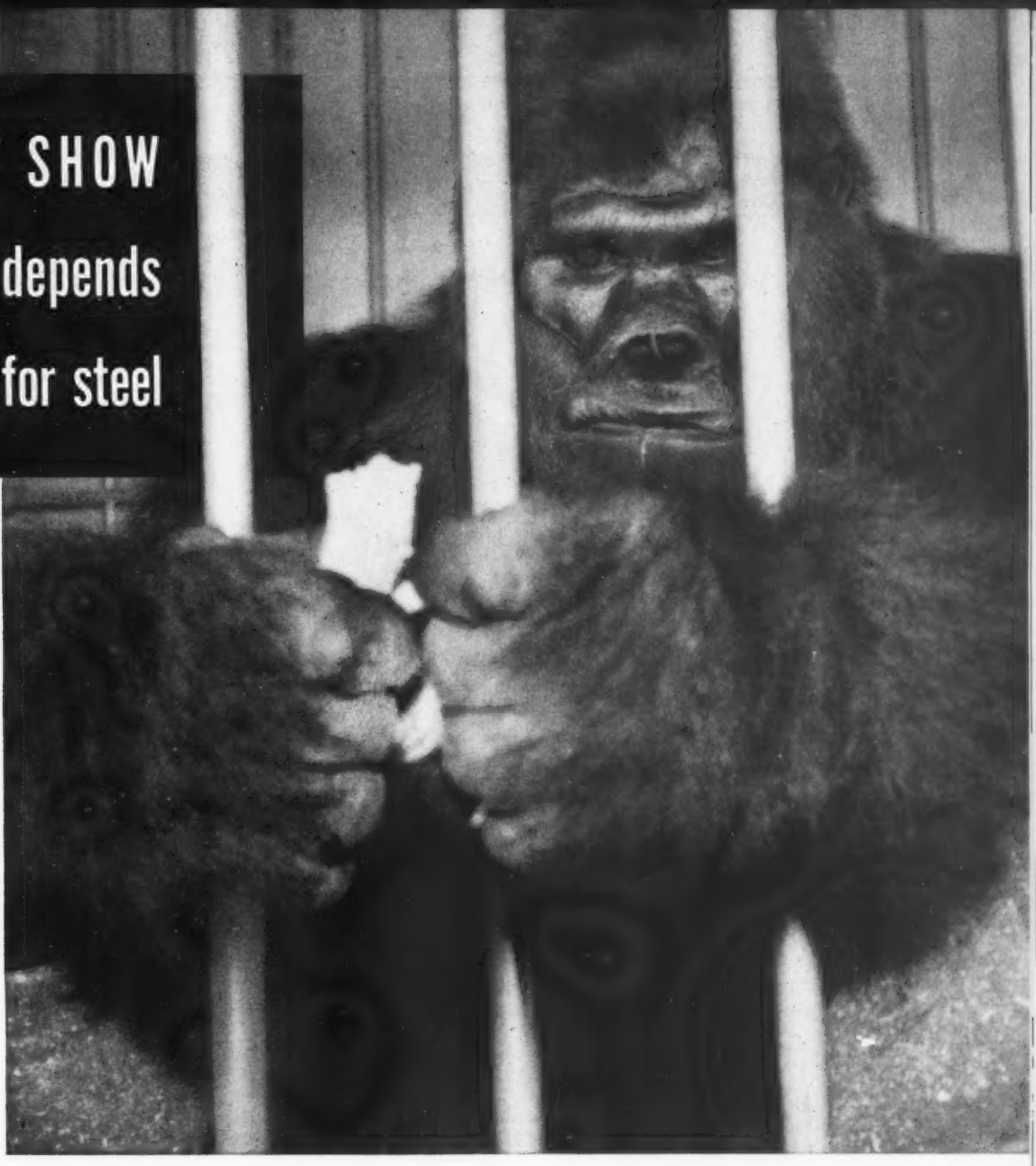
DIVISION OF S

MADE IN

ROCKFORD...MACHINE TOOL PLANTS CLOSE TO YOUR PLANT

ILLINOIS, U.S.A.

"GREATEST SHOW ON EARTH" depends on Ryerson for steel



Photograph courtesy Ringling Bros. and Barnum & Bailey Circus.

Even the circus needs steel from stock, not only bars but structurals, tubing and reinforcing steel. All are products that Ringling Bros. and Barnum & Bailey secure from Ryerson stocks.

Whatever *your* business and whatever *your* requirements, you'll also find the nearby Ryerson plant a time-saving steel source. While many sizes are missing because of the steel shortage, stocks are improving daily. And often, when a needed steel is not available the Ryerson salesman can suggest a practical alternate.

Combined with growing stocks, Ryerson facilities for cutting, bending, threading, riveting and punching, help to assure prompt delivery of steel exactly as needed. Today we cannot say, "every size of steel in stock for immediate shipment." But, all things considered, we can give surprisingly prompt, dependable service on many products.

Another advantage of Ryerson steel service is the strategic location of the eleven Ryerson plants. Steel needed for a distant operation can be ordered from the plant near your headquarters and shipped from the plant near your job. Why not take advantage of this extra service, at no extra cost, next time you need steel? Phone, wire or write the nearest plant.

RYERSON STEEL

Principal Products: Bars • Structurals • Plates • Sheets • Tubing • Alloy Steels • Allegheny Stainless • Tool Steel • Inland 4-Way Floor Plate Reinforcing Bars • Babbitt • Metal Working Tools & Machinery, etc.

JOSEPH T. RYERSON & SON, INC.
Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston

CUMBERLAND GROUND SHAFTS

An Exclusive Product made by an Exclusive Method

DIAMETERS 1-1/8" to 8" INCLUSIVE

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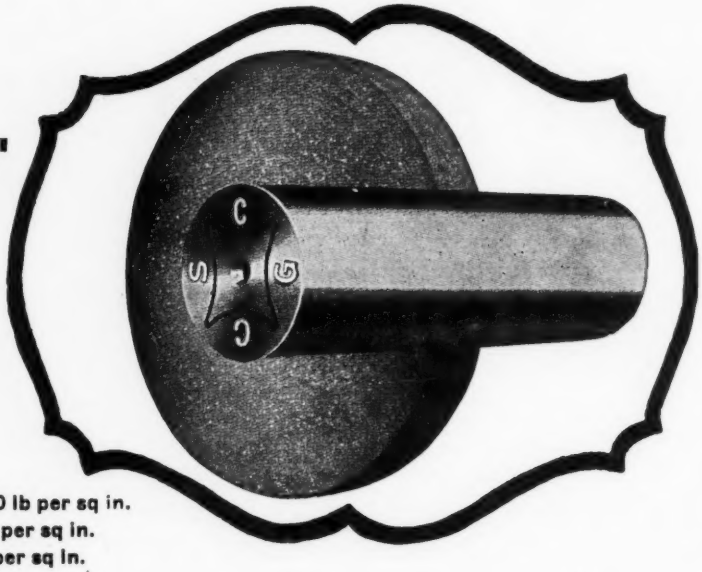
MINIMUM ELASTIC LIMIT

Cumberland Brand—30,000 lb per sq in.
Potomac Brand—45,000 lb per sq in.
Cumsco Brand—55,000 lb per sq in.



CONCENTRIC STRAIGHT ACCURATE

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MAXIMUM LENGTHS MANUFACTURED

Year 1845—up to 16 feet
Year 1886—up to 25 feet
Year 1945—up to 70 feet

They are carefully ground to our standard manufacturing tolerance, plus nothing to minus .002" on diameters 1-1/8" to 2-7/16" inclusive . . . plus nothing to minus .003" on diameters 2-1/2" to 8" inclusive. Closer tolerance can be furnished, if desired.

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CUMBERLAND STEEL COMPANY

CUMBERLAND, MARYLAND, U. S. A.
ESTABLISHED 1845 INCORPORATED 1888

TO KEEP YOU IN TUNE WITH THE TIMES

nothing equals Stainless Steel!

WITH so many unusual applications of Stainless Steel to talk about, we might be accused of harping on one string when we sing the merits of Stainless in such an everyday use as refrigerator shelves.

But as a matter of fact—with the exception of its resistance to heat—practically every superior advantage that Stainless offers is called into play in refrigerator shelving. Strength, lightness, resistance to corrosion and abrasion, brilliant permanent beauty, easy cleaning and easy fabrication—*all* are important.

And particularly important is this. The U·S·S Stainless Steel Wire for this and similar applications is available—for *early* delivery. So if you're making egg beaters, draining racks, pot handles, soap dishes or, in fact, ANYTHING that can be made of wire, here is a ready source of supply of the finest available.

In U·S·S Stainless Steel we offer you a perfected, service-tested stainless—produced not only in many different analyses, but in the most complete range of forms, sizes and finishes. Our Stainless Steel specialists are experts in its application. No matter what your product or in whatever field it is used, they can give you practical advice on Stainless Steel that will help you modernize and improve your line.

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USS STAINLESS STEEL UNITED STATES STEEL

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UNITED STATES STEEL

Excellent Delivery

Cast Bronze Bearings

● At the present time you can secure *all* your requirements in cast bronze bearings and bushings . . . *without delay*. This includes a size range up to four and one half inches inside diameter . . . any outside diameter . . . and lengths to thirteen inches.

New and enlarged facilities, more advanced methods and the return of skilled veterans makes it possible for us to fill your needs promptly, in any alloy, fully machined to precise measurements and tolerances. Send your prints in now . . . or call your local Johnson Bronze Representative.

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SLEEVE BEARING HEADQUARTERS
The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD
520 S. MILL STREET NEW CASTLE, PA.

Talide
(TUNGSTEN CARBIDE)
Performance!

TALIDE METAL MEETS EVERY REQUIREMENT

"98% More Production per Tool Grind with Talide Tools"

The chief engineer of a prominent manufacturer recently compared performance on different carbide cutting tools on a non-ferrous aircraft part. He reports . . .

"98%" More production per tool grind with TALIDE"

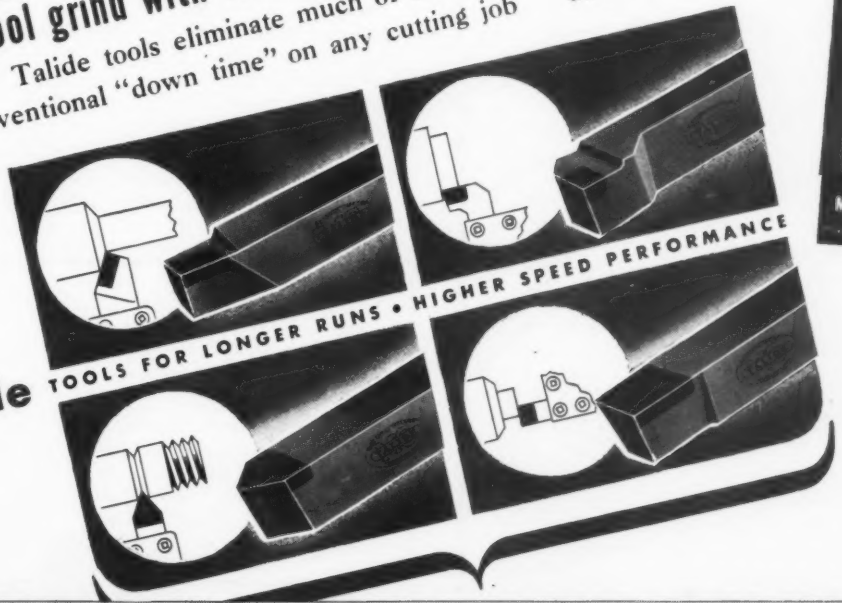
Talide tools eliminate much of the conventional "down time" on any cutting job —turning, boring, or facing. They keep cutting on and on and on.

Universally used for cutting operations on steel, cast iron and non-ferrous metals and non-metallic materials, Talide Tools are guaranteed to slice production costs.

You can obtain Talide tool tips direct from stock or a Talide sales engineer will call and recommend the proper use and grade of Talide Carbides for you.

Send for Catalog 44-T listing standard Talide Tools and Tips.

Talide TOOLS FOR LONGER RUNS • HIGHER SPEED PERFORMANCE



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THE ENGINEERED CARBIDE FOR ALL APPLICATIONS

MC TALIDE

METAL CARBIDES CORPORATION

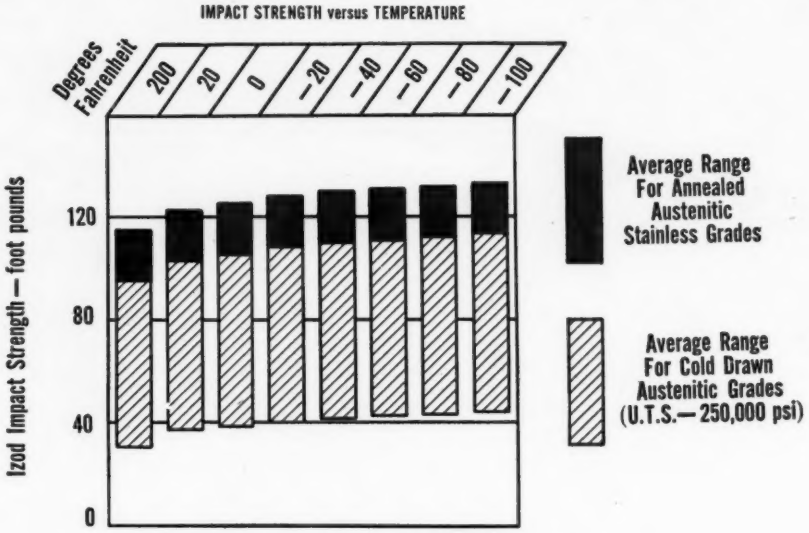
YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

SINTERED CARBIDES FOR CUTTING • HOT PRESSED CARBIDES FOR DRAWING AND WEAR RESISTANCE

RUSTLESS DATA SHEET NO. 7

Corrosion Resistance Plus Strength at Sub-Zero Temperatures

One of the Many Combinations of Properties Offered by Stainless Steels



Applies to types: 301, 302, 304, 309, 316, 321, and 347.

OPERATION of aircraft in the extreme cold of the stratosphere has placed more and more emphasis on engineering materials exhibiting high resistance to shock loads at temperatures many degrees below zero Fahrenheit. Also, equipment for handling liquefied gases such as oxygen, nitrogen, and hydrogen must operate at even lower temperatures . . . in the vicinity of —400° Fahrenheit. Ordinary steels have not been found suitable for essential working parts operating at such extremely low temperatures. They suffer material loss of toughness and become increasingly brittle as temperatures drop below zero.

At normal temperatures the austenitic or chromium-nickel stainless steels have extremely high toughness values—higher than any standard engineering alloy. As temperatures are reduced, a remarkable property of the austenitic stainless steels becomes apparent . . . toughness is further increased at sub-zero temperatures. Impact tests performed at reduced temperatures have indicated a continuous increase in toughness all the way down to —400° Fahrenheit. The results of some of these tests are shown on the above chart. Highest izod impact values are naturally obtained on annealed material, but even with material cold worked to 250,000 psi tensile strength, it is possible to obtain over 40 ft. lbs. izod impact strength at —80° Fahrenheit.

The chart does not include Rustless 18-8 FM, Type 303, which is the free-machining counterpart of Type 302. However, both the sulphur and selenium bearing grades of Type 303 exhibit proportional increases in toughness with decreasing temperatures even though their initial impact strengths are somewhat lower than that of Type 302. Thus, valve parts to be machined on automatics and subjected to extremely low-temperature service can be made of Rustless 18-8 FM, Type 303 and outstanding performance can be expected.

Stainless steels offer many other desirable properties to designers: Strength and resistance to scaling at extremely high temperatures, durability, stiffness, sales appeal and, above all—economy. They are remarkably versatile everyday engineering materials. Many grades have been developed to fit varying service requirements and fabricating conditions. Rustless' specialized experience in stainless steels can help you select the proper grade for your purpose. Consult our technical service staff.

Yes, there are many grades of stainless steel. While they are commonly referred to by A.I.S.I. type number, some mystifying trade names are used. Therefore, to aid users in correlating trade names, type numbers and the principal Government Specifications we offer our helpful publication "Trade Names of Stainless Steels." Write for your copy today.

Rustless

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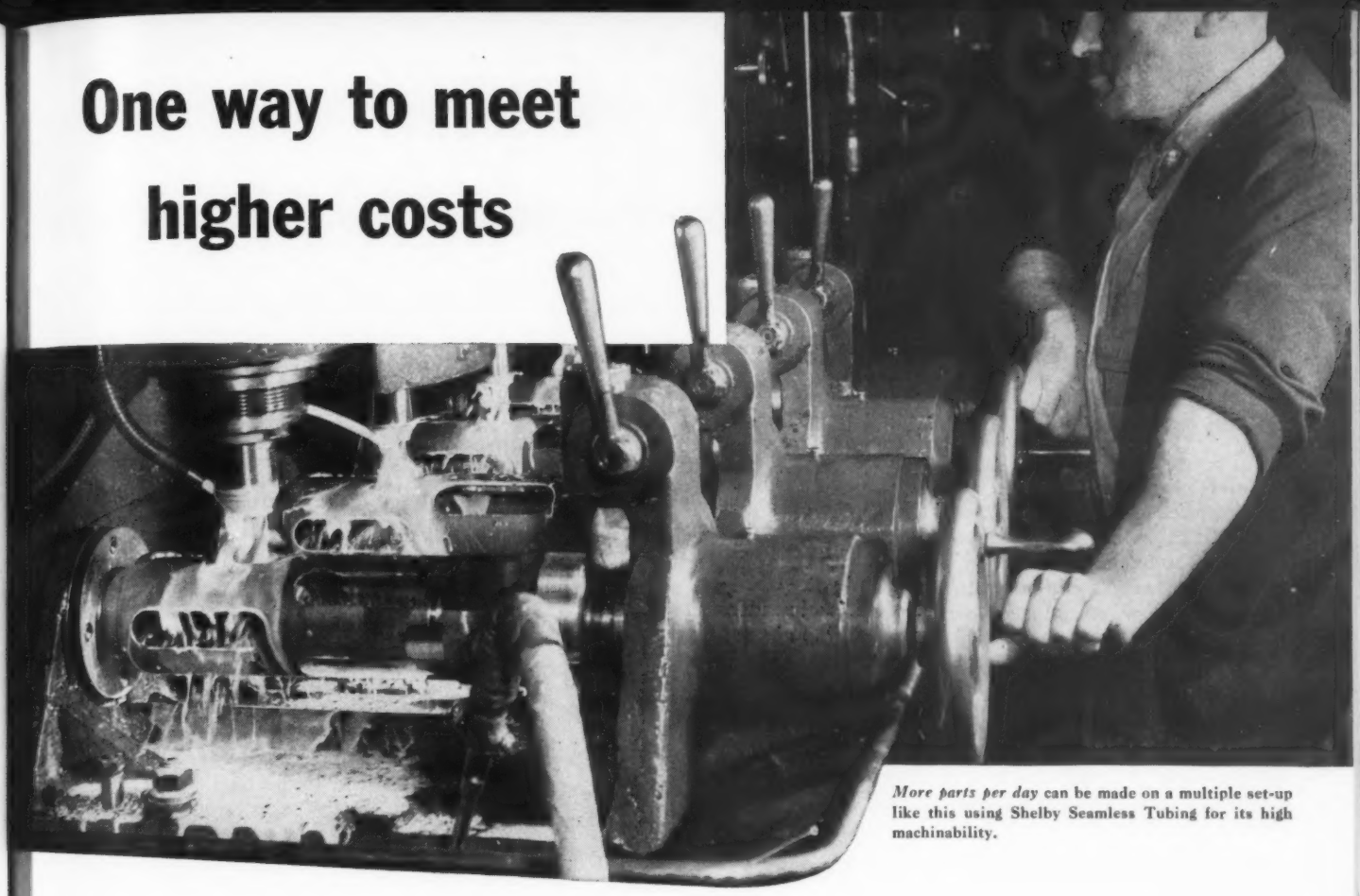
THE AMERICAN ROLLING MILL COMPANY

Baltimore 13, Maryland

STAINLESS STEEL SPECIALISTS

One way to meet higher costs



More parts per day can be made on a multiple set-up like this using Shelby Seamless Tubing for its high machinability.

Use Seamless Tubing and get more production per man-hour

It takes ingenuity to figure out ways to combat rising costs, but you can profit from the experience of others.

During the war, manufacturers learned that seamless steel tubing had advantages over solid forgings on scores of new type jobs. Production was increased many times by set-ups such as the one illustrated above.

With Shelby Seamless Tubing you start out with the basic shape already made. This eliminates at least a forging and certain machining operations. The better machinability of Shelby Tubing and its uniform high quality permit fast production. Parts can be turned out at considerably less cost than those made by slower methods.

You can obtain Shelby Seamless Tubing processed to suit your particular requirements. Our service engineers work with you and with our own metallurgical department to develop the material most suitable for your machining operations.

Sizes of Shelby Seamless Tubing range from ⅜ inch to 10½ O.D. inches and in wall thickness from .035 inches to 1.500 inches cold drawn. Write for complete details and analyses available.

1. Connector for truck and trailer. 2. Roller for tractor. 3. Bearing shell. 4. Pump impeller. 5. Winder for textile machine.

SHELBY SEAMLESS *Steel Tubing*

WALLS WITHOUT WELDS

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Tubing Specialties Division

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

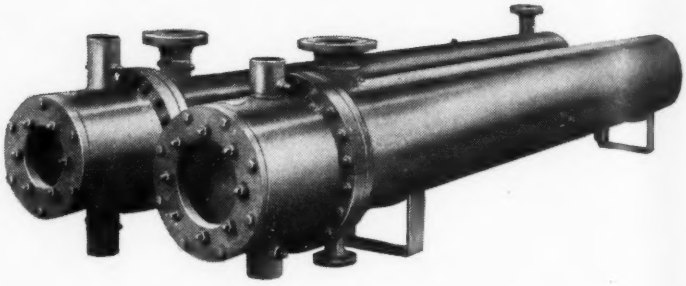
It's the ***FINAL COST*** *that counts*

...keep it low with non-ferrous ***NICKEL*** *alloys*

CUPRO-NICKEL

No Tube Deterioration Indicated after 6 Years of Service

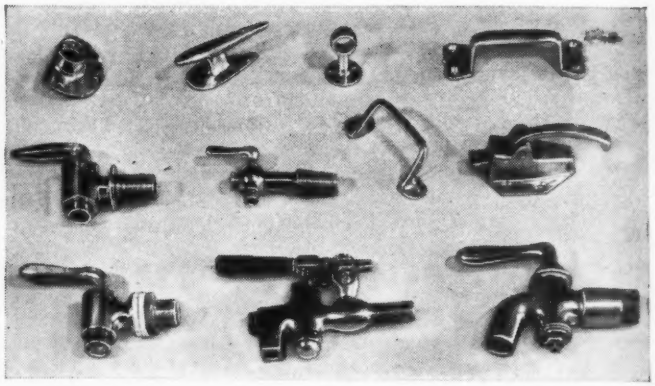
In these feedwater heaters, thin tube walls of .065 gage Cupro-Nickel permit high and rapid heat transfer at working pressures up to 900 pounds p.s.i. Hairpin bend U-tube units of 5/8" O.D. Anaconda Cupro-Nickel Tubes indicate no deterioration after serving 6 years. Characterized by high strength at operating temperatures, along with sturdy resistance to erosion and corrosion, Cupro-Nickel renders economies in applications throughout industry . . . just as it does in these heaters built by Struthers Wells Corp.



NICKEL SILVER

A Metal Combining Beauty with Practical Durability

The beauty of solid Nickel Silver impresses one instantly. Essentially white in color, Nickel Silver possesses strength as well as corrosion-resistant properties superior to the usual brasses. It is a metal that may be cast and worked by simple methods. Available in extruded, rolled, drawn and cast sections, this Nickel alloy lends itself to countless applications. A few items produced by the National Brass Works of Los Angeles, Calif. in 20 percent Nickel Silver, are shown at right.



NICKEL-BRONZE

A Little NICKEL Imparts Strength and Toughness

Only 2 percent of Nickel gives these gear rim blanks and transformer case castings what they need. Nickel improves the strength of standard bronzes and is particularly effective in raising elastic properties . . . increasing shock-resistance as much as 25 to 50 percent. Moreover, Nickel increases castability . . . thus it helps to reduce losses due to mis-runs and affords a widened casting range. The photograph shows Nickel-Bronze castings produced by the Philadelphia Bronze & Brass Corp.

EMBLEM OF SERVICE INCO Nickel TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.

Need Specialty Steel...*FAST?*

"CALL CRUCIBLE"

Here's How Crucible Warehouse Service can fill your needs—*save you time and money*

ALL OF THE STEEL you get from a Crucible Warehouse is Crucible's own make. This means that every item of high-speed—tool—die—stainless—alloy—machinery—or special purpose steel is backed by the Crucible mills, which guarantees adequate stocks of uniformly top quality in every warehouse.

Convenient and Time-Saving

The recent Harvard study pointed up the need for better control of steel buying as an important factor in control of production costs. Are you taking full advantage of centralized buying? Crucible's full-range warehouse service may make it possible for you to carry a lower steel inventory. Certainly it involves less paper work in checking and accounting—only one handling in the receiving department—requires no additional phone calls or orders to other suppliers.

Service Engineers Available

Crucible's Advisory Service, set up at each warehouse, brings you the services of experienced steel men. Your Crucible representative can give you sound help in selecting the *right* production steel and the *correct* tool or die steel with which to fabricate it. He can advise you on their most efficient use. In addition, mill metallurgists are available for consultation on special problems.

Crucible's Warehouses handle only Crucible steels . . . and the men who make Crucible steels know what each type is best for. Call on your nearest warehouse for expert advice.

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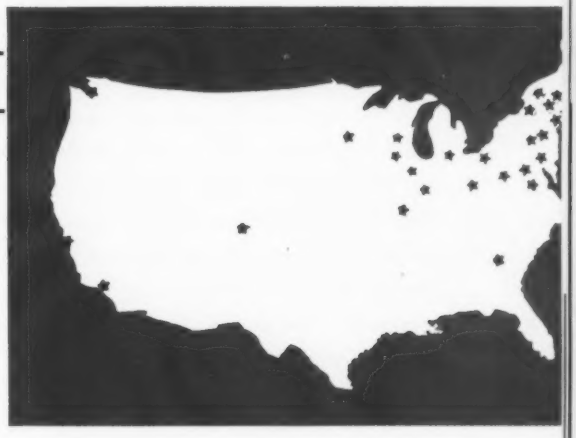
Boston, Mass.	135 Binney St., Cambridge 42	Kirkland 0435
Buffalo 3, N. Y.	69 Carroll St.	Cleveland 3521
Chicago 39, Ill.	4501-31 W. Cortland St.	Spaulding 0300
Cincinnati 25, Ohio	2900 Spring Grove Ave.	Kirby 3666
Cleveland 14, Ohio	1258-74 E. 55th St.	Henderson 9400
Denver 5, Colo.	2635 Walnut St.	Tabor 7218
Detroit 10, Mich.	3245 Hubbard Ave.	Lafayette 8200
Indianapolis 4, Ind.	308 W. Maryland St.	Lincoln 7461
Los Angeles 21, Cal.	1207-09 Santa Fe Ave.	Trinity 3707
Milwaukee 4, Wisc.	135 E. Pittsburgh Ave.	Marquette 6441
Newark, N. J.	S. Fourth St., Harrison	Market 3-3415
New Haven 8, Conn.	131 Park St.	5-6121
New York 9, N. Y.	650-52 E. 12th St.	Gramercy 7-8073
Philadelphia 23, Pa.	1224-28 Callowhill St.	Market 7-3993
Pittsburgh 30, Pa.	Oliver Building	Atlantic 3800
Providence 3, R. I.	116 Clifford St.	Gaspee 3895
Rockford 5, Ill.	1018 Rockford Nat'l Bank Bldg.	Forest 84
San Francisco 10, Calif.	2050 Bryant St.	Atwater 8011
Seattle 4, Washington	2755 First Ave., So.	Eliott 6050



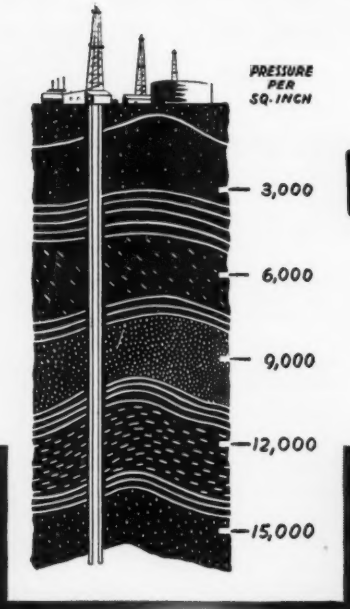
Crucible's Branch Warehouses and Sales Offices ★

Springfield 1, Mass.	118 Liberty St.	2-515
St. Louis 2, Mo.	1021 Chouteau Ave.	Central 866
St. Paul 4, Minn.	2395 University Ave.	Midway 590
Syracuse 2, N. Y.	114 S. Warren St.	5-990
Toronto 2, Ont.	300 Spadina Ave.	Waverly 302
Washington 5, D. C.	912-13 Shoreham Bldg.	National 760

CRUCIBLE STEEL COMPANY of America

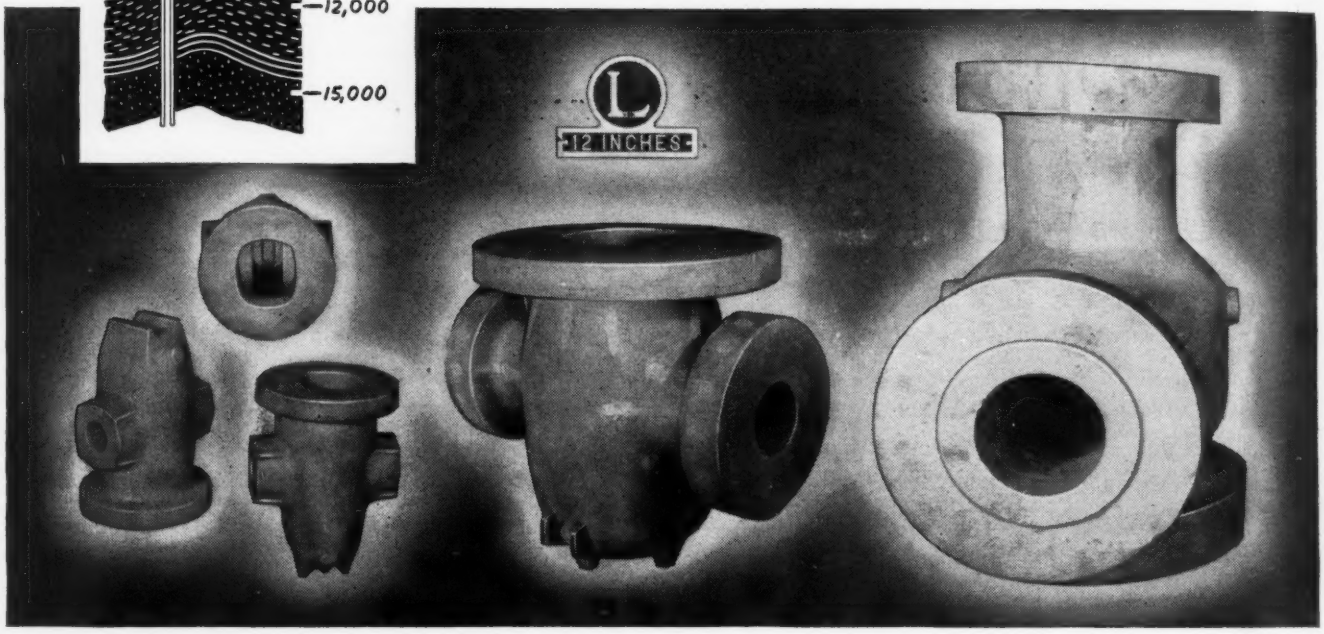
High Speed · Tool · Stainless · Alloy · Machinery — **Special Purpose Steels**

CHRYSLER BUILDING · 405 LEXINGTON AVE. · NEW YORK 17, N. Y.



Where Pressures are High

CASTINGS OF Ⓛ 205A1 ARE A SOUND CHOICE



AT some of the world's deepest oil wells—with depths to 13,778 feet—Lebanon Circle Ⓛ 205A1 castings are proving their ability to meet the exceptional pressures which are encountered. Circle Ⓛ 205A1 is widely noted for reliability under high pressure and meets the specifications of the American Petroleum Institute for oil well control valves and oil fittings up to 15,000 pounds test pressure per square inch. It has also found wide application in chemical and other industries when pressures are critically high.

The soundness and integrity of Circle Ⓛ 205A1 high-strength alloy steel castings and their outstanding physical properties are derived not alone from their chemical analysis but very largely from the extra heat treatment which they received in Lebanon's scientifically controlled furnaces.

Circle Ⓛ 205A1 is an alloy which permits an extensive range of design possibilities.

Lebanon's modern facilities and advanced foundry methods are ready to serve your particular casting requirements. Let us work with you to satisfy your needs.

LEBANON CIRCLE Ⓛ 205A1 A Nickel-Chromium-Molybdenum Alloy Steel	
Minimum Physical Properties — Normalized and Drawn	
Tensile Strength . . . 100,000 lbs.	Elongation in 2" . . 17%
Yield Point 65,000	Reduction of Area . 30%
Brinell Hardness Average . . . 210	

Write for complete data sheet

LEBANON STEEL FOUNDRY • LEBANON, PA.

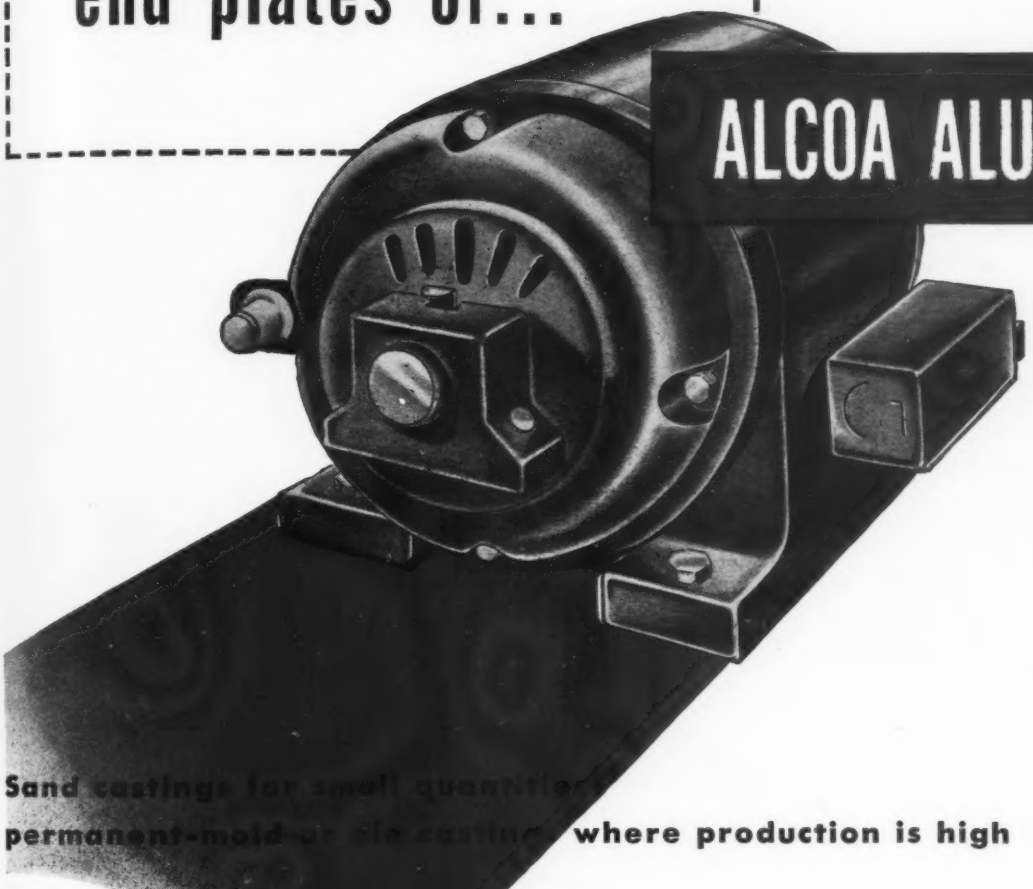
"In The Lebanon Valley"

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

Lebanon CIRCLE L ALLOY AND STEEL Castings

Make those motor end plates of...

ALCOA ALUMINUM



Sand castings for small quantities, permanent-mold or die castings where production is high

Consider what Alcoa Aluminum sand plate castings will do for your motor production—permanent-mold and die castings for volume production, sand castings where quantities of any one model are small.

Little excess metal need be left on Alcoa permanent-mold and die castings, since dimensions can be held to close limits. Machining time and costs are consequently much less. Surfaces are smooth, taking a fine finish with a minimum of preparation.

In addition, you reduce the over-all weight of electric motors by making their end plates of aluminum. A four-pound saving on a ⅓ H.P. motor is typical. This means easier handling all along the line, and lower shipping costs.

Check on the use of Alcoa Aluminum by calling the nearby Alcoa office.

Or write ALUMINUM COMPANY OF AMERICA, 1748 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

IN EVERY COMMERCIAL FORM

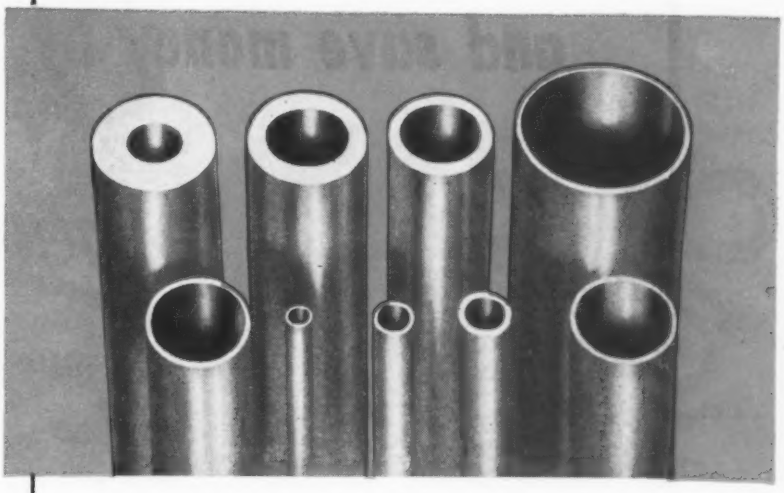
What jobs have you for CARMET to do?
In addition to a most complete line of Carmet cutting tools and blanks, we are equipped to make pre-formed parts of sintered carbides to practically *any* specification for type, size, shape or tolerance—furnished plain or finish-ground. ● Solve that "problem-part" of yours—*call for an Allegheny Ludlum Tool Engineer.*
Here's an Example! Plunger, Bearing and Cutting Die, made of CARMET Carbide
AL
Allegheny Ludlum Steel Corporation
CARBIDE ALLOYS DIVISION, Ferndale (Detroit) Michigan

16 WAYS TO CUT COSTS

by machining parts from Timken Seamless Tubing

If you machine cylindrical or ring shaped parts out of bar stock, consider these 16 possible ways to save by using Timken Seamless Steel Tubing:

1. *Save* by eliminating heavy drills.
2. *Save* by reducing machine tool wear.
3. *Save* by faster machining.
4. *Save* by less evaporation of coolant due to better circulation.
5. *Save* by less tool wear due to lower temperature.
6. *Save* by quicker gaging of cooler surfaces.
7. *Save* by more accurate machining resulting from cooler operations.
8. *Save* by less grinding of smoother machined surfaces.
9. *Save* by combining more operations.
10. *Save* by releasing screw machine stations.
11. *Save* by cheaper handling of lighter stock.
12. *Save* on magazine recharging time due to lighter stock.
13. *Save* by reducing tool changes.
14. *Save* on tool grinding operations.
15. *Save* by use of longer stock in magazines.
16. *Save* by reducing crop-end losses.



★ When Timken Seamless Steel Tubing replaces bar stock in production of tubular parts, amount of the saving usually comes as a surprise to the user. And quite often, performance of the finished part is definitely improved because of the ability of Timken Metallurgists to tailor alloy steel tubing to exacting specifications.

The Timken Roller Bearing Company is the world's largest *producer,* and at the same time the world's largest *user* of alloy steel seamless tubes for mechanical applications. Its Technical Staff is recognized everywhere as the undisputed authority on production, selection and machining of alloy steel seamless tubes. For a Job Analysis of any part you make, write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
Fine Alloy
STEEL AND SEAMLESS TUBES

★ YEARS AHEAD — THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS in hot rolled and cold finished Alloy Steel Bars for forging and machining applications, as well as a complete range of Stainless, Graphitic and Standard Tool Steel analyses. Also Alloy and Stainless Seamless Steel Tubing for mechanical and pressure tube applications.

STOP RUST on parts between operations, avoid rejects and save money by using . . .

OAKITE *Special* PROTECTIVE OIL

Humidity, acid or gaseous fumes, finger marks . . . these and other factors are primary causes of rust frequently found on ferrous parts after such operations as machining, grinding, drilling, sand blasting; brazing, tumbling, pickling. But there is a quick, low-cost, easy-to-apply rust-preventive that not only saves time and effort but also eliminates the trouble, extra work and expense of pre-drying before rust-proofing parts or surfaces that have been degreased and rinsed. For dependable in-door rust-prevention use Oakite Special Protective Oil!

Applied to surfaces by dip method, Oakite Special Protective Oil leaves a thin, transparent film of oil that protects precision finished surfaces, repels moisture and successfully inhibits rust formation. Does not discolor surfaces. Easy to remove when necessary. Use it to combat rust on screw machined parts, flat steel specialties, stamped and formed parts, bolts, nuts, gears, drills, dies, piston rings, saw blades and similar tools and parts.

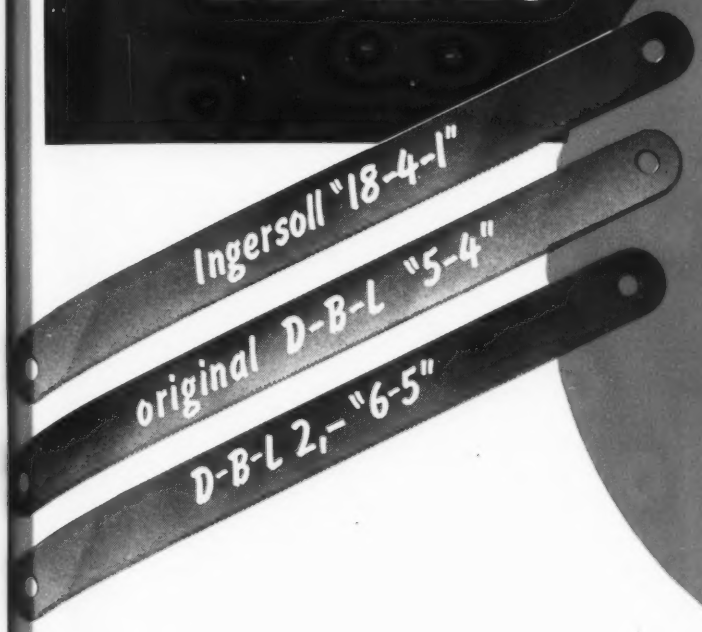
THIS FREE BOOKLET GIVES DETAILS

A 16-page booklet, free for the asking, describes various methods of applying Oakite Special Protective Oil, concentrations to use; gives summarized case-histories on its advantages and economies on many different types of work. This new booklet is sure to contain the answer to all your in-door rust-prevention problems, so write for your FREE copy TODAY!

OAKITE PRODUCTS, INC., 24 Thames Street, NEW YORK 6, N. Y.
Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE *Specialized* CLEANING
MATERIALS • METHODS • SERVICE

These Steels take the "HACK" OUT OF HACK SAW BLADES



When you order hack saw blades from your regular supplier, make it a rule to specify blades made of "Ingersoll 18-4-1" or of "Ingersoll D-B-L." Both are steels that really take the "hack" out of hack saw blades. That's why blades made of these Ingersoll steels are being used today in so many shops and plants all over America.

Ingersoll "18-4-1" Steel is again available to blade makers. Where "D-B-L Blades" are preferred, remember only Ingersoll has had a 6-year record in the successful production of this steel which insures blades with tough cutting edges, high impact resistance and relative freedom from decarburization.

INGERSOLL "18-4-1"

INGERSOLL D-B-L**

INGERSOLL *Steel Division*

Borg-Warner Corporation • New Castle, Indiana

Plants: New Castle, Indiana • Chicago, Illinois • Kalamazoo, Michigan

*Furnished in the original D-B-L Regular, -"5-4" and D-B-L 2, -"6-5".

ENGINEERING B-W PRODUCTION

INGERSOLL *Special Steels for Special Uses*

Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels

BETHLEHEM

Tool Steel Reference List

Bethlehem tool steels range from the straight-carbon types to the highly-alloyed, special-purpose grades so often required in modern practice.

Broadly speaking, the standard Bethlehem tool steels come under seven main headings. The following list is a general guide, and it includes the steels for almost every job in your plant:

	CLASSIFICATION	TYPE ANALYSIS	TRADE NAMES
1.	General-Purpose Tool and Die Steels *(water-quenching)*	C or C-V 0.70 to 1.40 carbon range	X; Best; XCL; Superior; XX
2.	Safe-Hardening Tool and Die Steels *(oil-quenching)*	Mn-Cr-W-V Ni-Cr-Mo	BTR Bethalloy
3.	Air-Hardening Tool and Die Steels *(air-quenching)*	Mn-Cr-Mo	AH; AH-5
4.	High-Production Tool and Die Steels	High C, High Cr	Lehigh L; Lehigh H; Lehigh S
5.	Shock-Resisting Steels	Si-Mn W Cr-V	No. 71 Alloy; Omega No. 67 Chisel Tough (H and M tempers)
6.	Hot-Work Steels	Cr-Mo W	Cr-Mo-W; Cr-Mo-V No. 57 Hot Work; No. 57 Special Hot Work
7.	High-Speed Steels	W W-Mo	Bethlehem Special High Speed; Comokut; Red Tiger (Improved) 66 High Speed; Moco; HM

Remember, our specialists are always ready to talk applications with you. Call us when tool-steel problems get tough—or better still, let us work with you from the start.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

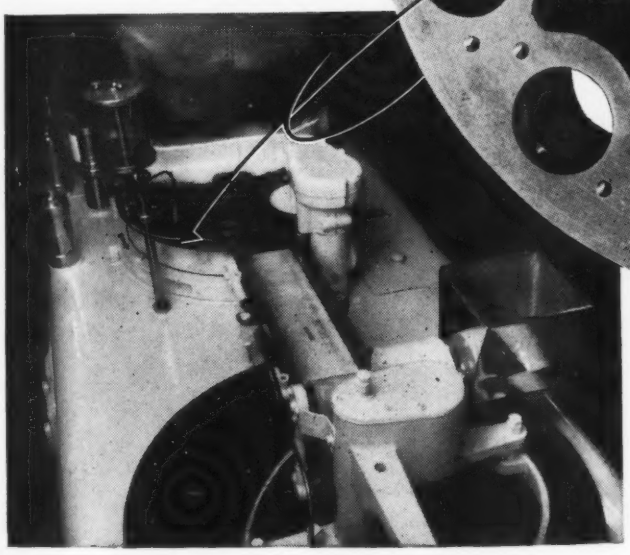
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Bethlehem tool steels for every purpose

BETHLEHEM STEEL

Where superior corrosive and heat resistant qualities are "MUSTS"—

CRAMP NI-IRON for Jobs that only an ALLOY can do



Specify CRAMP ALLOY No. 265

"Ni-Resist"—Cramp Alloy No. 265—is an alloy cast iron with corrosive and heat-resistant qualities superior to those of cast iron.

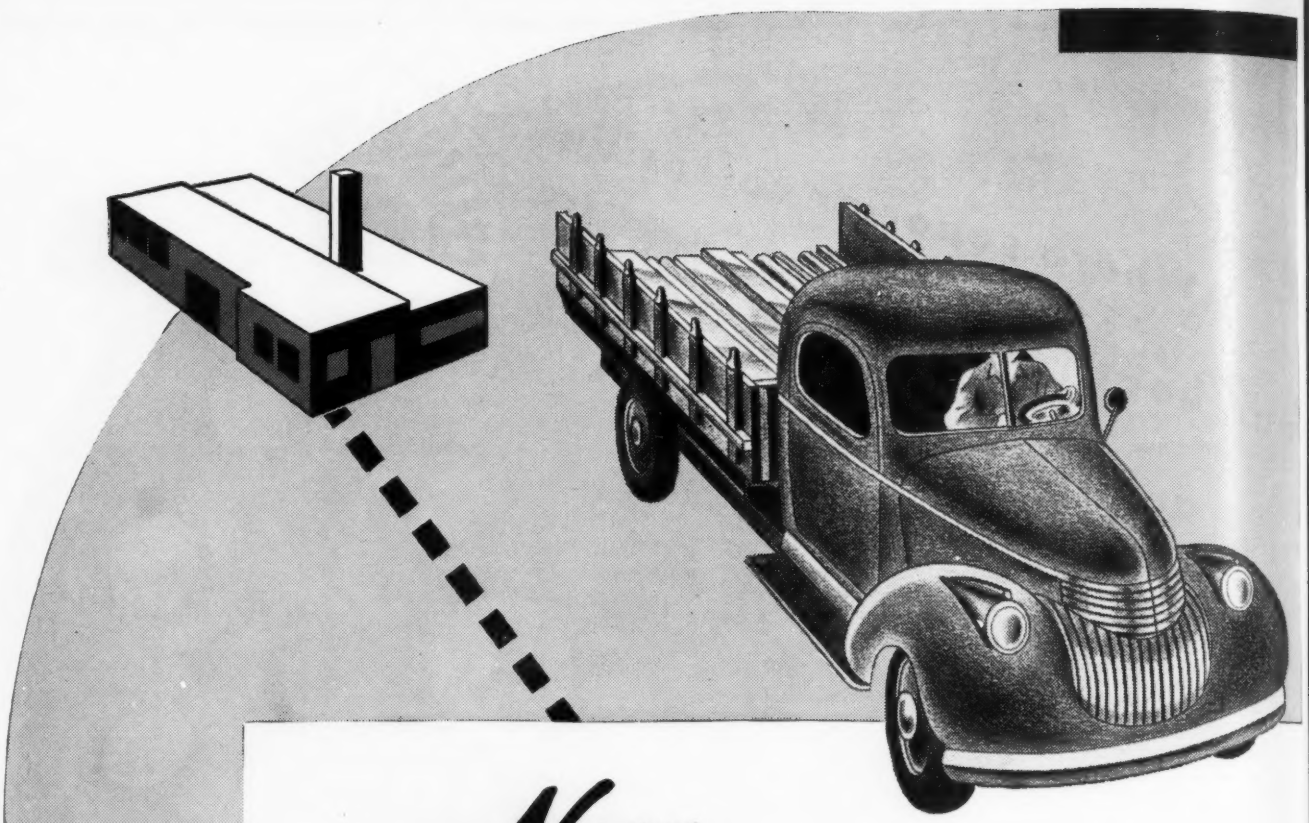
Alloy No. 265 is recommended for high temperature applications, and for services where non-rusting qualities are desired. It is furnished with or without copper, as desired.

The design of modern machinery for maximum life and performance calls for a variety of service properties in materials . . . and the Cramp Line of alloys offers a wide range. For the many jobs that only an alloy can do . . . use Cramp Ni-Iron. The Baldwin Locomotive Works, Philadelphia 42, Pa., U.S.A. Offices: Philadelphia, New York, Chicago, St. Louis, Washington, Boston, San Francisco, Cleveland, Detroit, Pittsburgh, Houston, Birmingham, Norfolk.

WRITE FOR BULLETIN 194

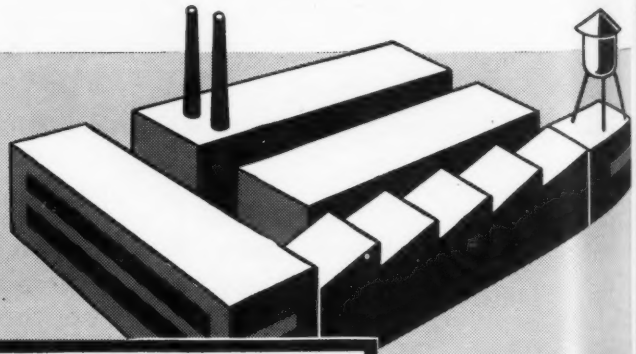
This helpful catalog lists composition and properties of over 30 ferrous and non-ferrous alloys. Sent on request.

BLW THE BALDWIN GROUP **BALDWIN**



Now

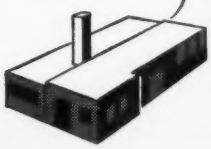
THIS COMPLETE WAREHOUSE SERVICE BRINGS *Carpenter* STEELS TO YOUR PLANT *Faster*



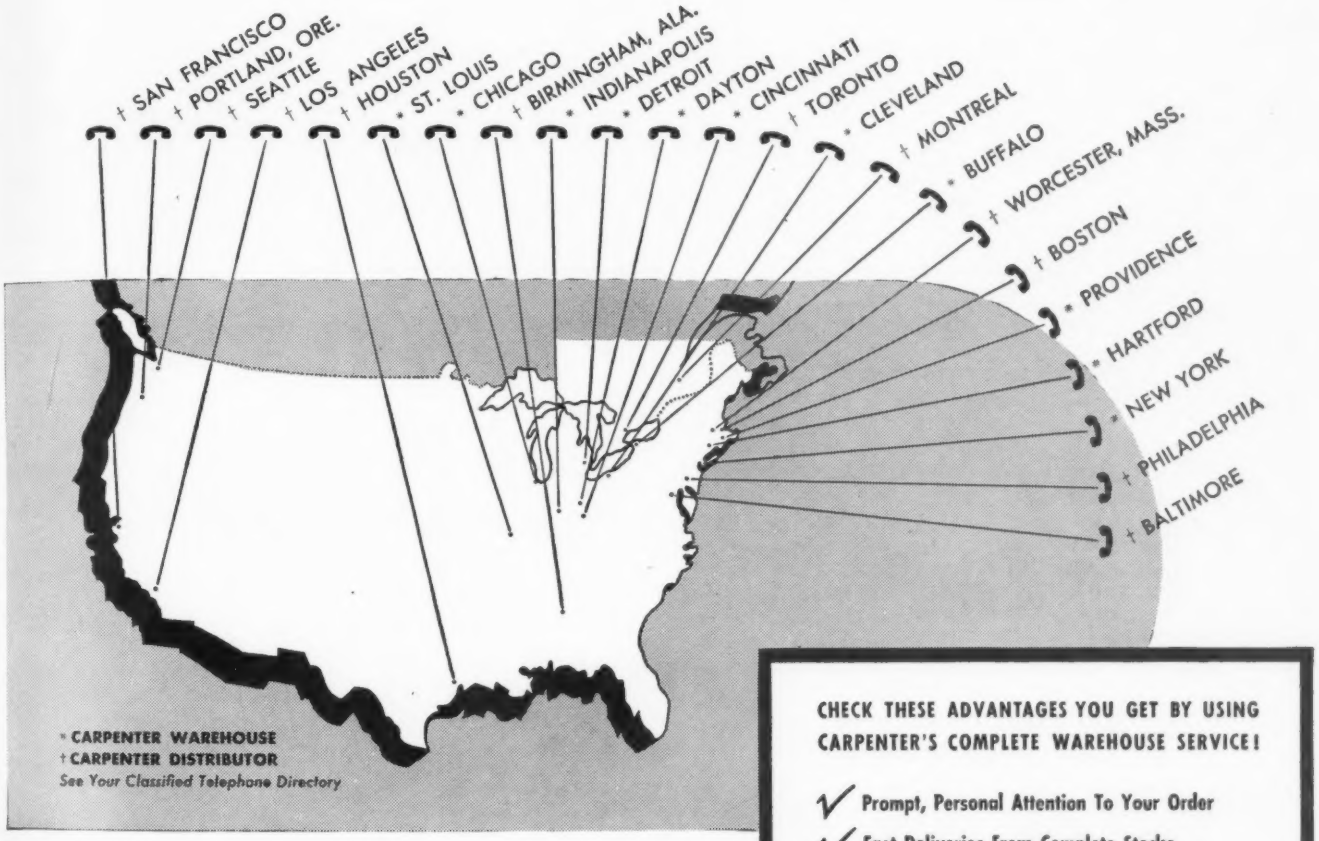
Call YOUR CARPENTER WAREHOUSE FOR FAST DELIVERY OF - -

Carpenter

- Matched Tool Steels
- Stainless No. 5 and No. 8 Free-Machining Bars
- High Speed Tool Bits
- Tool Steel Drill Rods
- Special Purpose Alloy Steels



RIGHT NOW you can get really quick delivery of standard sizes from your nearest Carpenter Warehouse or Distributor. With Carpenter's expanded warehouse service, 90% of the metalworking industry is within 24-hour delivery from a Carpenter Warehouse or Distributor. And in addition to this expanded warehouse service, you are assured of getting top-notch quality in every lot of Carpenter Steel you use. Carpenter Warehouses and Distributors, conveniently located throughout the U. S. and Canada, are ready to give you prompt service NOW.



TO HELP YOU cut production costs and improve performance, we can give you complete, printed information on the proper selection and use of Carpenter Quality Controlled Steels. Contact your nearby Carpenter Representative today for the information you need.

CHECK THESE ADVANTAGES YOU GET BY USING CARPENTER'S COMPLETE WAREHOUSE SERVICE!

- ✓ Prompt, Personal Attention To Your Order
- ✓ Fast Deliveries From Complete Stocks
- ✓ Choice Of Wide Range Of Sizes
- ✓ Lower Inventories In Your Plant
- ✓ Personal Help With Your Production Problems
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THE CARPENTER STEEL COMPANY • 105 W. BERN STREET, READING, PA.

Carpenter

QUALITY CONTROLLED

TOOL, ALLOY & STAINLESS STEELS

Answers Lubrication Problems

IN HONING FOR PRECISION

SINCLAIR HONOL*

Makes for precision honing on all metals on which mirror finish is desirable.

With re-established peace-time emphasis on honing operations, make sure quality and precision of production are maintained at top peak by application of proper cutting and grinding fluid.

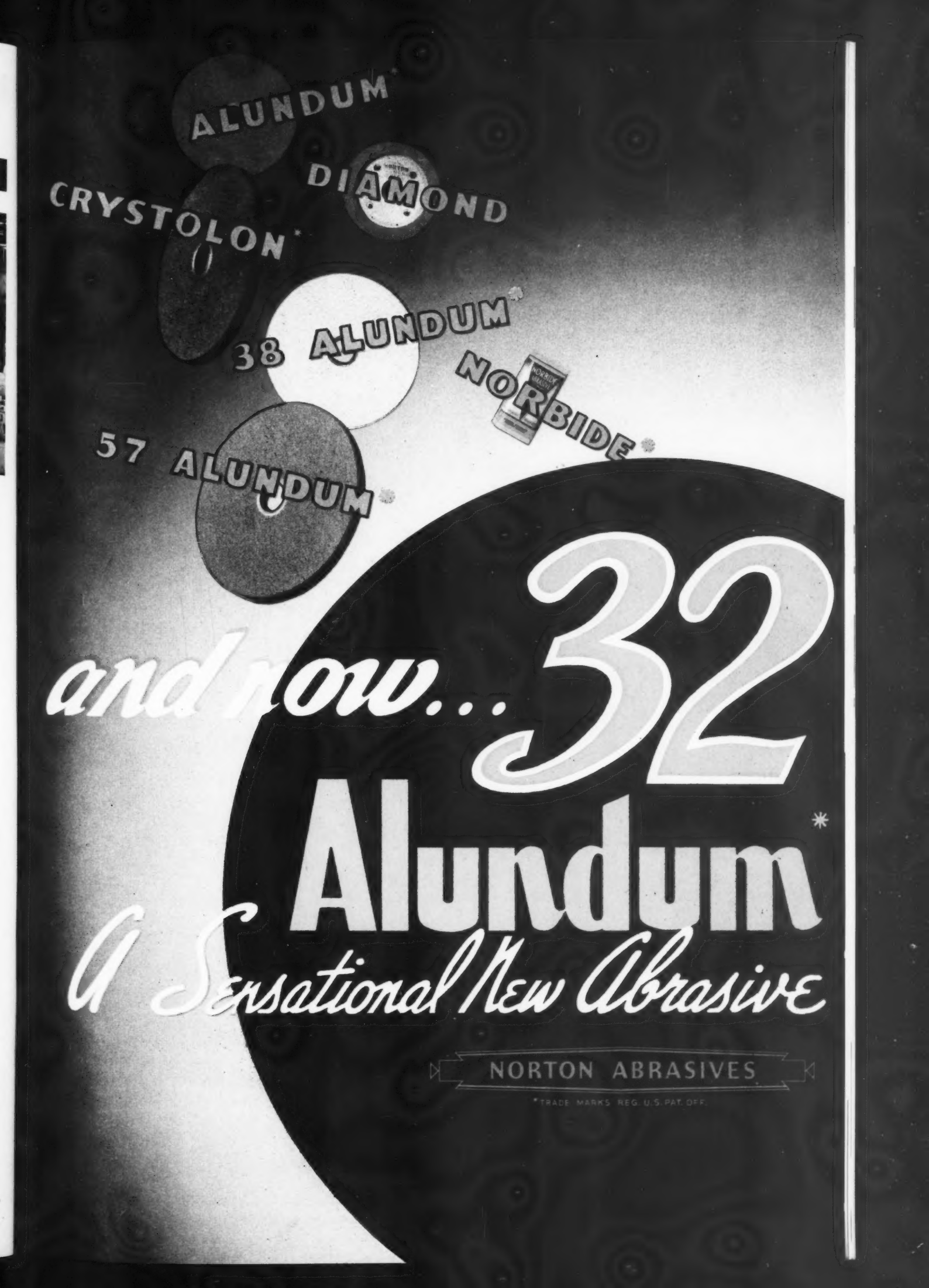
Sinclair HONOL is a specially developed coolant which gives exceptional accuracy and finish in the honing of cylindrical shafts, cylinders, and other internal surfaces.

HONOL's use permits highest speeds and at the same time increases life of stones. Sinclair consultants skilled in cutting operation lubrication are available for advice.

**Honing fluid. U. S. Pat. Off. Reg. Applied for.*

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.


ALUNDUM*
DIAMOND
CRYSTOLON*
38 ALUNDUM*
NORBIDE*
57 ALUNDUM*
and now... 32
Alundum*
A Sensational New Abrasive
NORTON ABRASIVES
*TRADE MARKS REG. U.S. PAT. OFF.

The Most Important Development since NORTON introduced in 1901

the original Electric-Furnace-Made Aluminum Oxide Abrasive (ALUNDUM*)!

CUT FASTER

CUT COOLER

FEWER DRESSINGS

LAST LONGER

32 ALUNDUM ABRASIVE

WHAT "32" IS

An entirely new type of aluminum oxide abrasive.

Radically different in appearance.

Radically different in shape.

Made differently by a Norton-invented and patented process.

Each super-cutting grain is a single crystal — individually produced in the electric furnace — not crushed to size.

First and only abrasive with a sharp, nubbly surface for super cutting action.

The only abrasive which combines a strong grain structure with a cool cutting action.

WHAT "32" DOES

Cuts deeper and faster

Cuts freer without burning

Requires fewer dressings

Gives longer wheel life

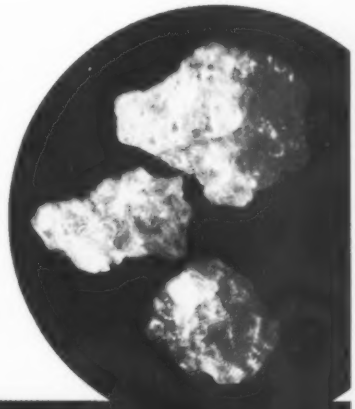
Reduces grinding time

HOW "32" IS MADE

32 Alundum abrasive is made by a patented Norton process which creates single crystals of high purity in a fluid matrix in an electric furnace. Each crystal being separately formed has a strong, solid shape and many sharply pointed nubs. To retain these many sharp cutting edges the crystals are not crushed but are separated from the matrix by a complicated and continuous chemical process. They are then screened without crushing into the standard grain sizes. The great number and the sharpness of the nubs enable grinding wheels of 32 Alundum abrasive to penetrate metal deeper, cleaner and faster.

Stocks of Wheels For Surface, Tool and Internal Grinding Available Now

Tests on other types of grinding are in progress and the use of 32 Alundum wheels will soon be extended into other fields.



Here's a photomicrograph of typical grains of 32 Alundum abrasive. Note how they combine sharp cutting angles with a strong, solid shape. Note also the rough, nubbly surface that insures secure bonding.

NORTON ABRASIVES

Here Are a Few Examples of the Sensational Performance of

32 ALUNDUM GRINDING WHEELS

TOOL GRINDING
8 x ½ x 1½" — 32A54-K5VBE

"On cutters, reamers, and end mills of high speed steel and molybdenum steel it cut faster and gave better finish than previous wheel without discoloring the work. Held corner better and cut much cooler."

SURFACE GRINDING
12 x 2 x 5" — 32A46-G8VBE

"Best wheel ever used on high carbon, high chrome steel. Removed .002 to .003" of stock compared to .0005" with previous wheel. Longer life."

TOOL GRINDING
7/5 x 2 x 1¼" — 32A54-J5VBE

"Cut cooler and faster than any wheel ever tried. Adopted in place of competing wheel."

SURFACE GRINDING
Segments in Norton Chuck
32A36-E12VBEP

"Much better than competing product. Cut cool and fast—less burn, little dressing, life three times longer."

INTERNAL GRINDING
¾ x ¾ x ⅜" — 32A60-J8VBE

"Most outstanding internal wheel ever used at this plant. Cut six times faster, or .003" per pass compared to .0005". Excellent finish. Life tripled. No dressing required."

ENTHUSIASTIC reports like these are coming in from plant after plant where 32 Alundum wheels have been tested. Now you can enjoy the same outstanding performance on your surface, tool and internal grinding jobs.

Because 32 Alundum grinding wheels are so sharp compared with other wheels a change in grade or in grain size is often necessary when making conversions. Your Norton abrasive engineer or distributor's abrasive specialist will be glad to give you the proper 32 Alundum wheel specifications. Or write to the Sales Engineering Department giving full information about your jobs, including the specifications of the wheels now being used.

NORTON COMPANY, WORCESTER 6, MASS.

New York - Detroit - Chicago - Cleveland - Pittsburgh
Philadelphia - Denver - Los Angeles - Hamilton, Ontario

Behr Manning Corporation, Troy, N. Y. is a division of Norton Company

10-46

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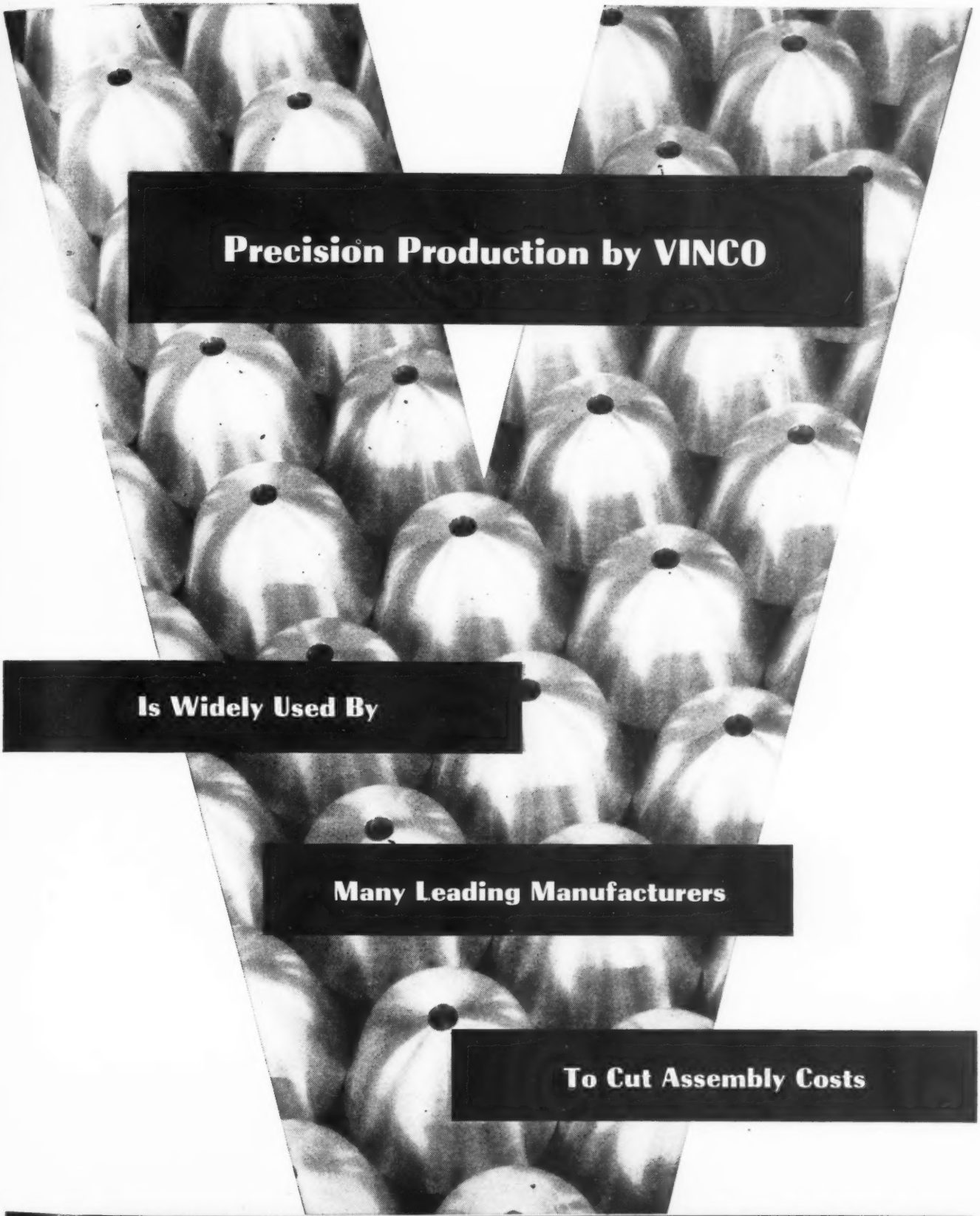


MILLIONTHS OF AN INCH FOR SALE BY VINCO

REG. U. S. PAT. OFF.

VINCO CORPORATION, 8853 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN; SALES OFFICES, NEW YORK, CHICAGO, CLEVELAND

Semi-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser • Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread Plugs, Rings and Setting Plug Gages • Spur and Helical Master Gears • Munition Gages • Propeller Shaft and Hub Gages • Built-up and Special Gages • Gear Rolling Inspection Fixtures • Indexing Fixtures • Hydraulic Power Control, Utilization and Distribution Units • Engineering, Design and Development • Precision Production Parts.

They Came To

The Part . . .

All tolerances on this star are within .0001".

The Fixture . . . Designed and built by VINCO to control the slotting operation on the above part. It is plainly apparent that extreme accuracy and painstaking construction of the fixture is mandatory if the specified tolerances of the part are to be held. This is a typical example of all precision fixtures built by VINCO. A thorough analysis of the job requirements, careful designing, skillful grinding, lapping and finishing of all essential parts to a gage exactness is VINCO'S established procedure in the construction of precision built fixtures.

VINCO

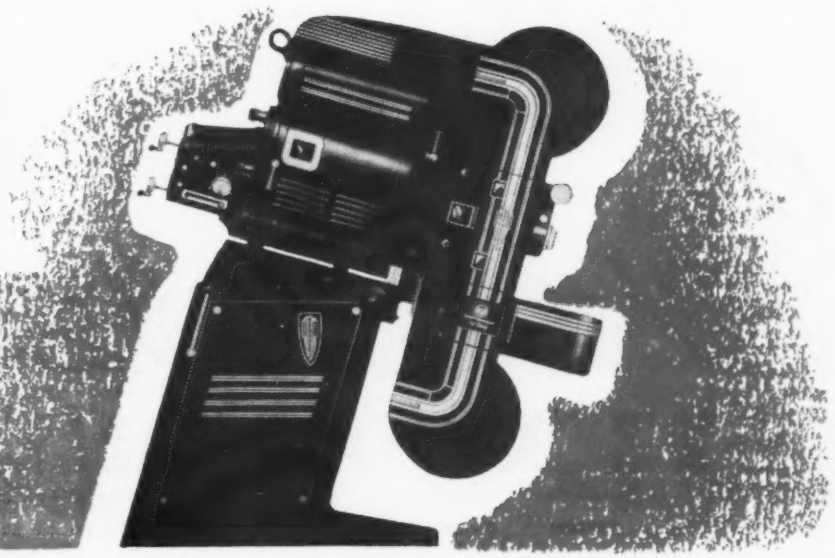
With a tough production job. Toil and sweat had convinced the Brenkert Light Projection Company, a subsidiary of Radio Corporation of America, that the star part, shown on the opposite page, would require an overall accuracy to within .0001" if it were to function at its planned efficiency. *Twenty-four times each second* this part must start and stop and, between each pause, attain a speed of 3485 R.P.M. Such performance called for accuracy to the Nth degree and Brenkert knew they needed the "tops" in gages and fixtures to attain and hold such close limits so;

They Came to Vinco

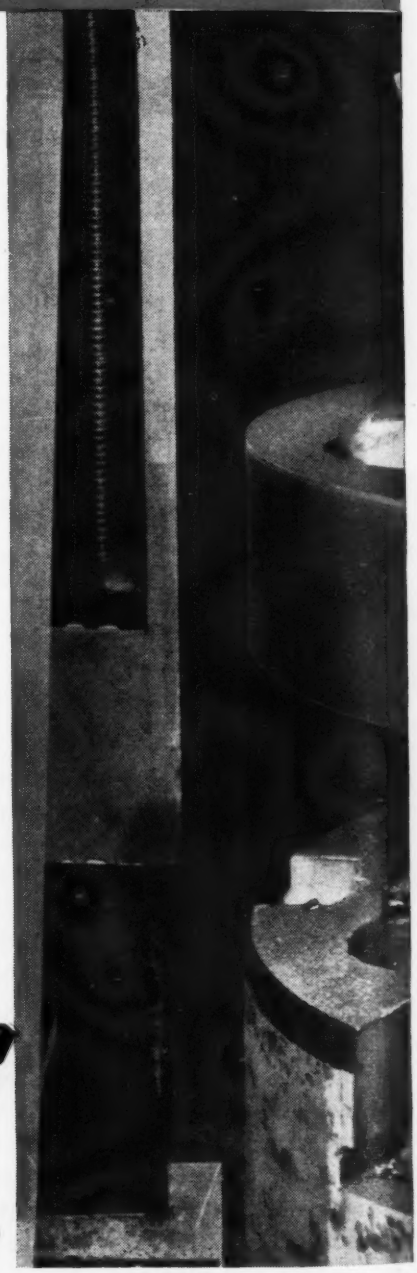
Our successful completion of this and many other assignments for Brenkert Light Projection Co., is a matter of record. The surest way to gain and maintain precision production of any part or parts is to first ascertain and then supply the needed equipment to make this production possible. Selecting and producing this equipment requires highly specialized engineering knowledge and mechanical skill. A proven, reliable source for this specialized service is VINCO. Over twenty-five years of widely varied experience in close tolerance work is our guarantee for this statement.

The Product . . .

The Brenkert "80" Motion Picture Projector—the successful result of ceaseless research, superlative engineering and skilled craftsmanship. Hidden away in this projector is the star we have been talking about. It is the vital element of a finely co-ordinated mechanism known as the intermittent. It is the action of this intermittent which produces the illusion of motion that you see on the screen. The vastly improved action of the Brenkert Intermittent has reduced annoying picture unsteadiness to its lowest point and increased light efficiency to the highest degree yet attained.



5 times as many the feed and triple



CONDITIONS

- **Depth of cut—1/4″ to 3/8″ (note intermittent cut over holes)**
- **Feed per revolution—1/16″**
- **Cutting speed—190 feet per minute**
- **Firthite grade used . . . . Grade H**

Firthite sintered carbide used on this job of turning and facing a cast iron spindle carrier achieved: *greater output* with *increased cutting speed* . . . 190 fpm instead of former 55 fpm; feed per revolution 1/16 inch as compared with 1/32 inch. A significant Firthite case history.

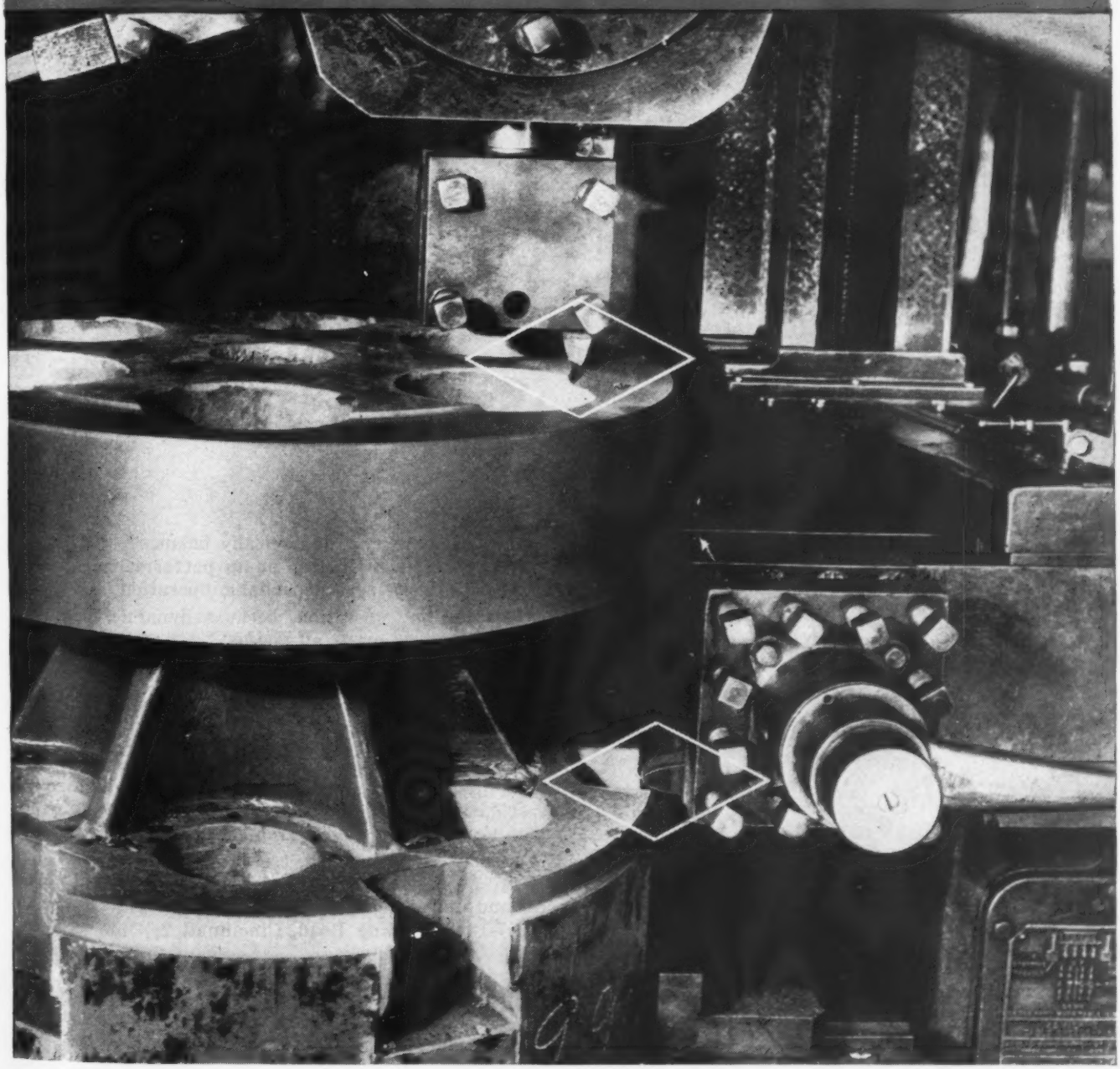
Call

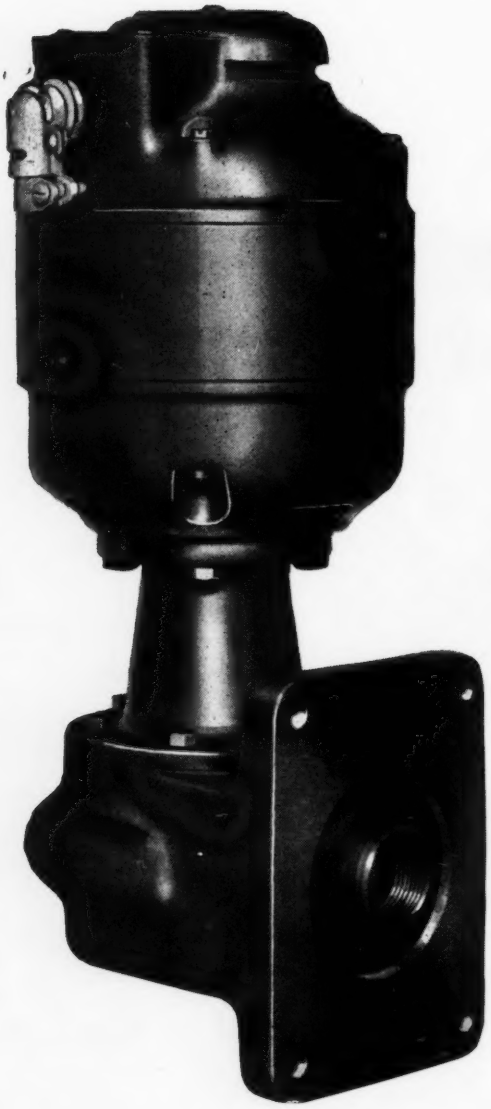
Firth-Sterling

STEEL COMPANY

McKEESPORT, PA. • NEW YORK • HARTFORD • PHILADELPHIA • PITTSBURGH • CLEVELAND
DAYTON • DETROIT • CHICAGO • LOS ANGELES

pieces per grind at double the speed with FIRTHITE





better pump performance

DYNAMICALLY BALANCED!

greater accuracy • smoother machine operation

All Gusher Coolant Pumps are now dynamically balanced to give you three extra advantages! You get better pump performance; longer, trouble-free service; smoother, more dependable operation.

You get smoother machine operation, because dynamic balancing eliminates coolant pump vibration at all speeds.

And you get greater accuracy on precision machining jobs, because of this velvet-smooth operation.

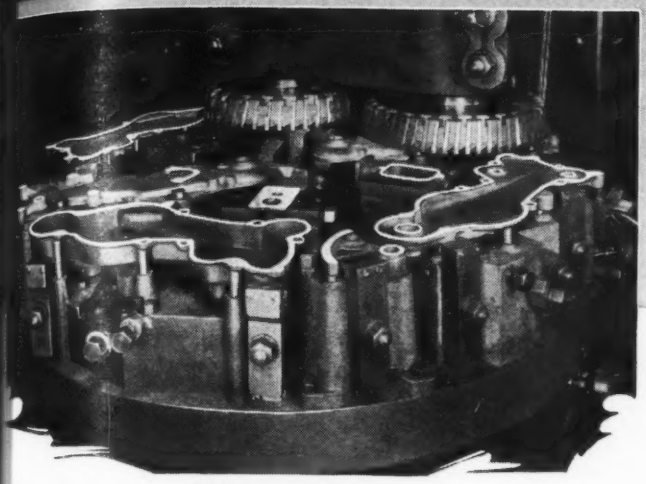
You get all these advantages—plus the already well-known features of Gusher Coolant Pumps: Full ball-bearing design, with fewer moving parts and rugged, one-piece shaft . . . No metal-to-metal contacts in the impeller, permitting grit and small chips to pass right through without clogging or harming the pump in any way . . . Instant starting, without priming . . . Controllable volume, from a trickle to full capacity.

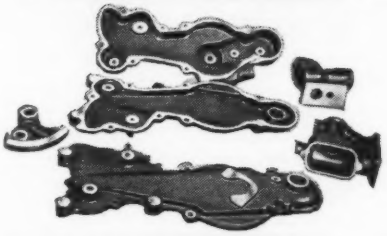
For a long life of smooth, economical, trouble-free operation, equip your machines with Dynamically Balanced Gusher Coolant Pumps. There are types and sizes for every application. The Ruthman Machinery Co., 1807-1823 Reading Road, Cincinnati 2, Ohio.

THE COOLANT *Heart* FOR A GOOD MACHINE

GUSHER COOLANT PUMPS

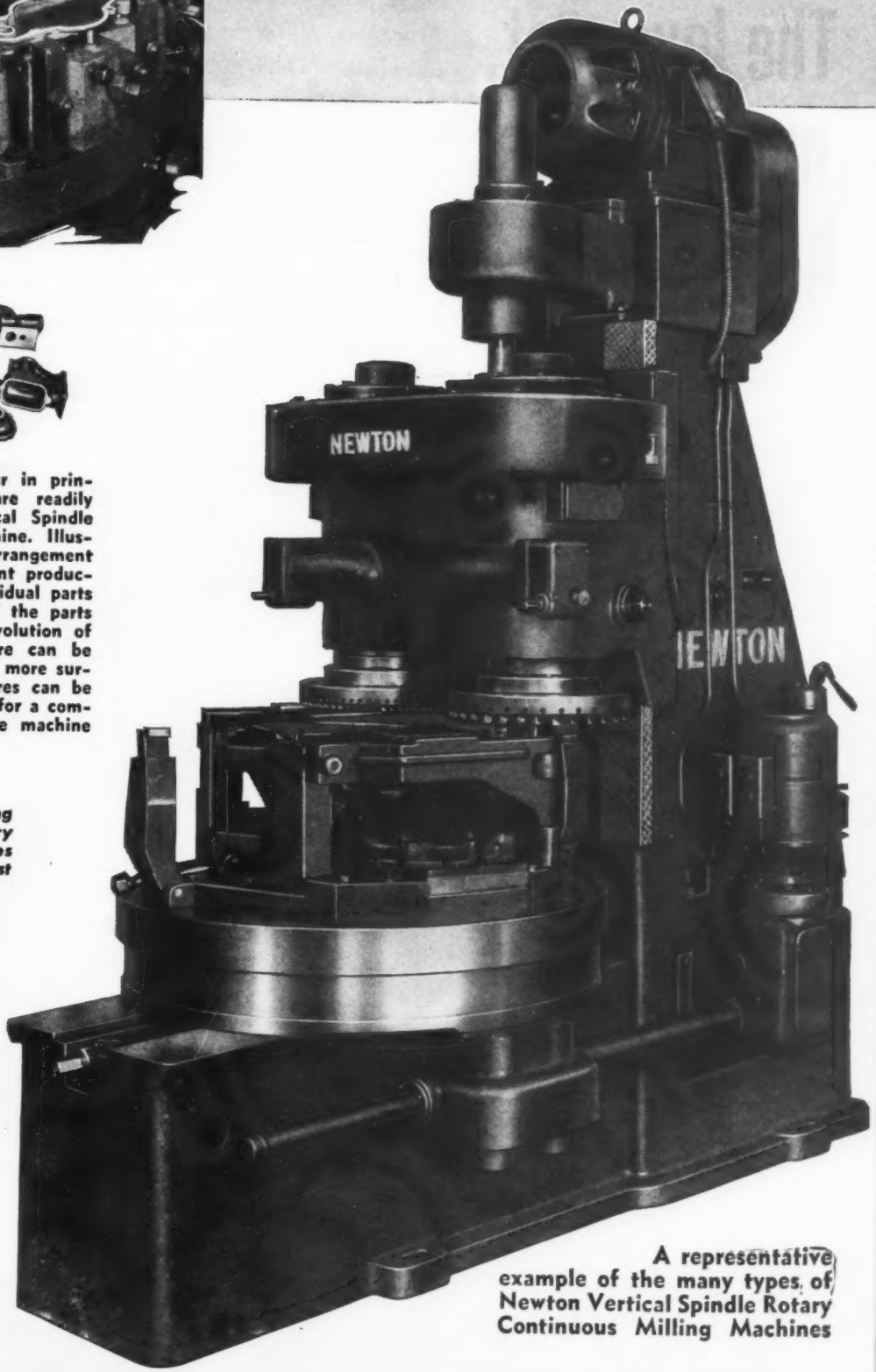
Let one machine with one operator do the work of several





Work-piece arrangements, similar in principle to that shown above, are readily handled on any Newton Vertical Spindle Rotary Continuous Milling Machine. Illustrated here is a fixture arrangement especially adapted to smaller plant production where the quantity of individual parts to be finished is limited. All of the parts shown can be milled at one revolution of the table. Similarly, the fixture can be arranged to accommodate two or more surfaces of the same piece. Fixtures can be arranged to mill all parts needed for a complete assembly, thus keeping the machine in continuous production.

Complete information covering Newton Vertical Spindle Rotary Continuous Milling Machines will be furnished upon request



A representative example of the many types of Newton Vertical Spindle Rotary Continuous Milling Machines

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER
SPECIAL MACHINES

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1861

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

The low-cost, multi-purpose ball bearing

A ball bearing has a life-line, too. This life-line is well defined in the physical make-up of each of the bearing's component parts. That's why you see only *through-hardened,* chrome alloy precision balls and high-grade, carburized, hardened and tempered cold-rolled steel rings in Schatz "Commercial" Ball Bearings.

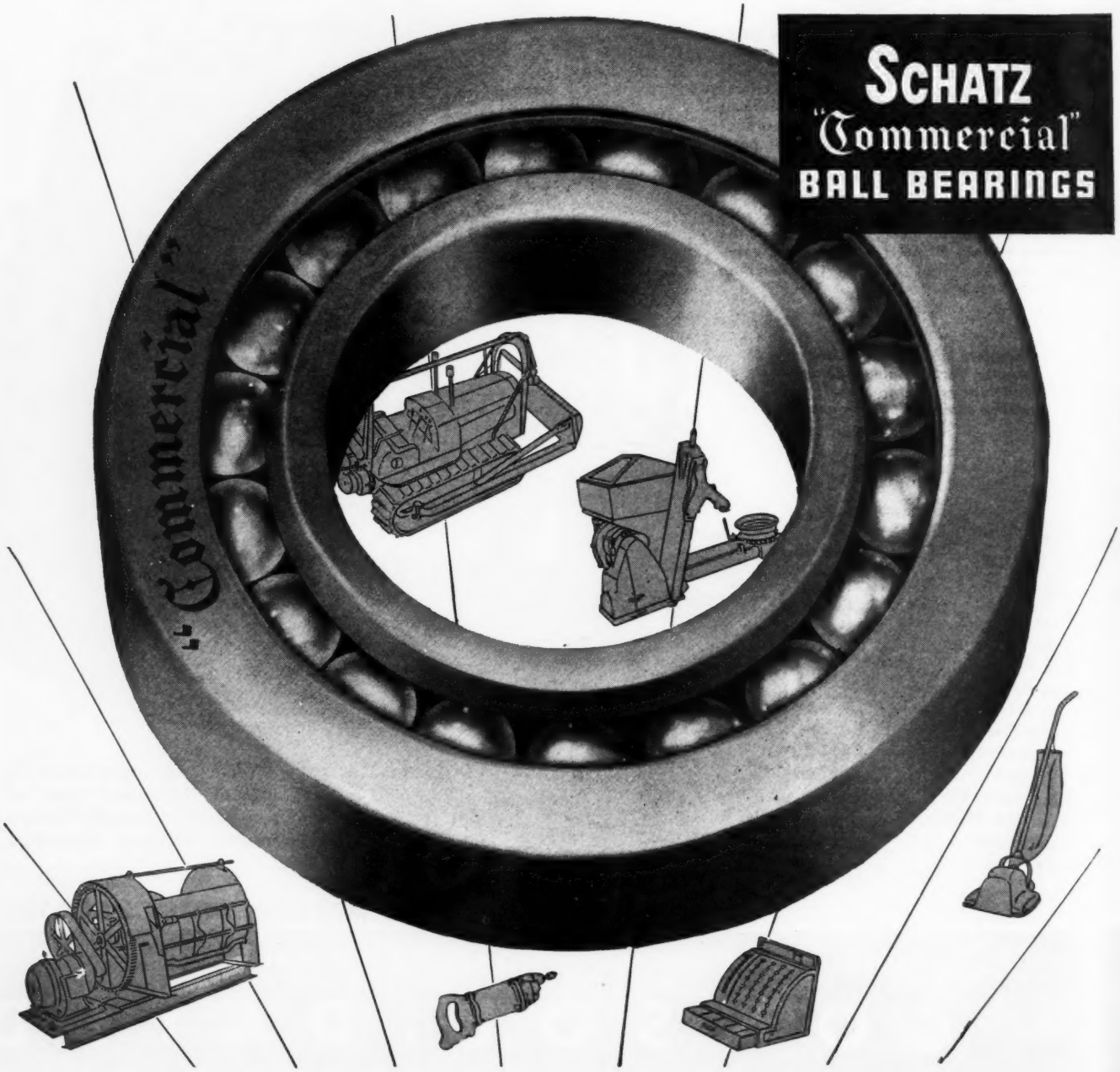
High fatigue resistance, added load capacity for the tougher jobs and an unusually wide application range are the end results of this inherently sturdy construction.

Schatz Bearings are engineered and manufactured in every standard type and size to deliver friction-free performance at low initial cost. Service requirements which vary from stokers to vacuum cleaners, bicycles to chain hoists, bulldozers to portable tools are all in a day's work for "Commercials."

Call on Schatz "know-how" to help fit this multi-purpose bearing to your needs. Then compare its on-the-job performance with other low-cost ball bearings.

THE SCHATZ MANUFACTURING COMPANY
POUGHKEEPSIE, NEW YORK
REPRESENTATIVES LOCATED AT

Detroit . . . . . 2640 Book Tower–26
Chicago . . . . . 8 S. Michigan Avenue–3
Cleveland . . . . . 402 Swetland Building–15
Los Angeles . . . . . 5410 Wilshire Boulevard–36



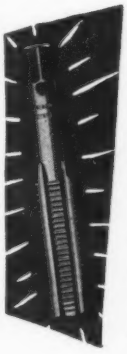
Do the TAPS you're now using give you these *5 Extra* ADVANTAGES?

1. COLD TEMPER

Threadwell High Speed Taps are given deep-freeze treatment at 120° below zero to make them stronger but less brittle. They produce clean, accurate threads and more of them per tap — in steels, cast iron, alloys, plastics and other abrasive materials.

2. "I-DOT-IFICATION"

Threadwell Taps have a *red* dot on the shank to identify cut thread, *white* dot on commercial ground, *blue* dot on precision ground. You know instantly that the tap fits the job.



3. TAP-CAPSULE

Threadwell Ground Thread Taps come in neat, metal-capped, transparent plastic tubes that protect these fine precision cutting tools against dirt and damage yet permit ready selection of type and size without unwrapping or handling.

4. GREASELESS RUST-PROOFING

Threadwell Taps are always clean and dry, ready for instant use, yet always bright and shining because of Threadwell's special greaseless rust-proofing process.

5. "PERSONAL ATTENTION" TO YOUR TAP NEEDS

Threadwell's personal attention policy applies to every order, large or small — at the factory and at the Threadwell distributor's in your locality, for he has been carefully selected to provide prompt, intelligent attention to your needs.

Next time, specify Threadwell Taps and get the Benefit of these Five Extra Advantages.

Threadwell products are sold exclusively thru Mill Supply Distributors

THREADWELL DISTRIBUTORS ARE IN LEADING INDUSTRIAL CENTERS THROUGHOUT AMERICA

Export Distributors

Canada — Bridge Machinery Company, Montreal

England — Skylux, Ltd., London

Brazil — Alfredo Kramer & Cia. Ltda., Rio de Janeiro, Sao Paulo

W. Picard, Sierra Gorda 180 Lomas, Seccion Lago, Mexico, D. F.

John H. Graham & Co., Inc. of New York City

THROUGHOUT THE REST OF THE WORLD

Threadwell

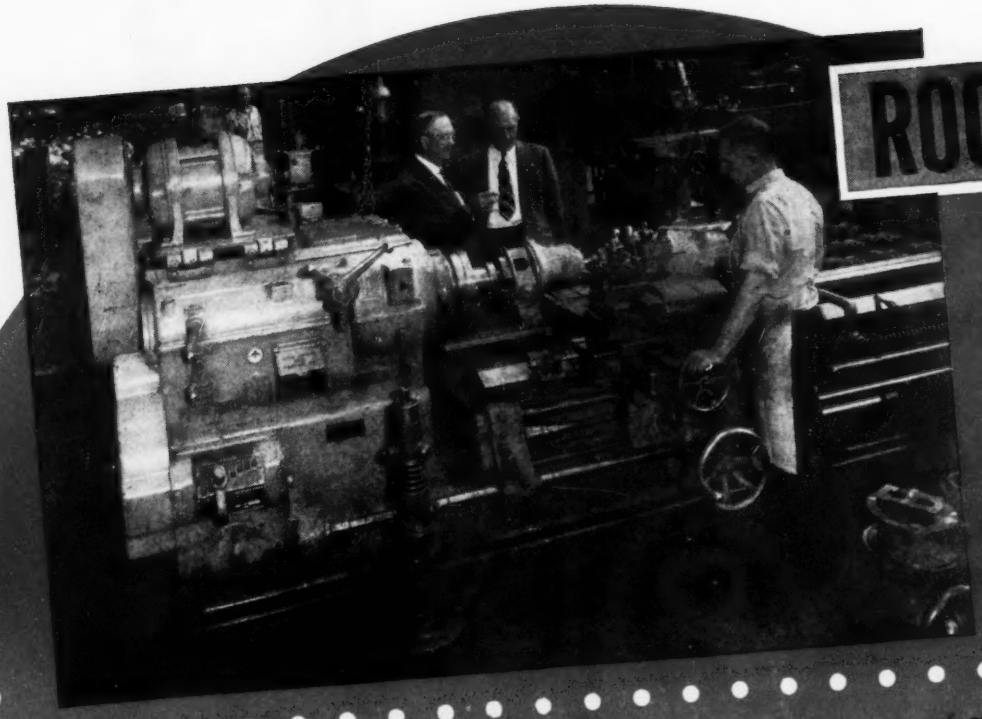
SINCE 1902

"TAPS OF DISTINCTION"

THREADWELL TAP AND DIE COMPANY • GREENFIELD, MASSACHUSETTS, U. S. A.

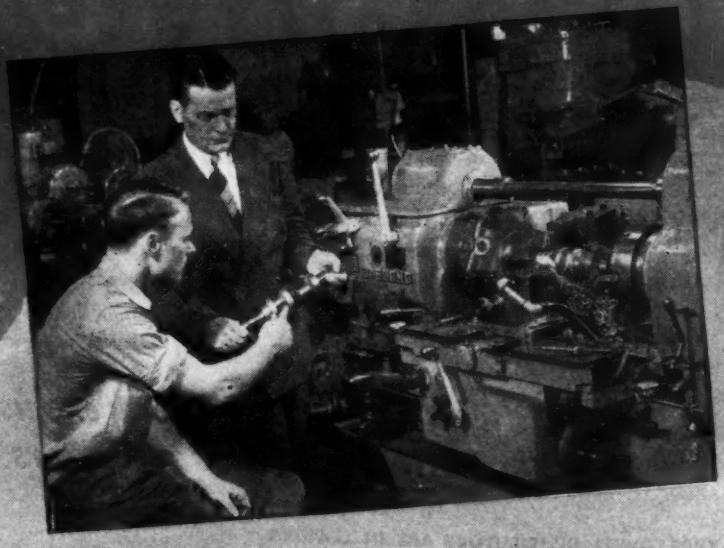
CALIFORNIA OFFICE, THREADWELL TAP & DIE CO. OF CALIF., 1322 SANTA FE AVE., LOS ANGELES 21

ROCHESTER



F. W. SCHIEFER,
F. W. Schiefer Mach. Co.,
Rochester, N. Y.

"I've just visited the ideal combination . . . fine shop, fine product, and fine machine setup . . . I'm referring to the RITTER COMPANY, INC., here in Rochester, N. Y. I learned all over again how versatile our sliding bed gap lathes really are. Here's what Mr. C. E. Codd, Ritter's Master Mechanic, reports: 'This machine is busy sixteen hours a day on our production work for cylinders for the different types of chairs we manufacture. We have also used this to advantage on grooving fly wheels for punch presses, and also on electrostatic separators on which it is necessary to open the bed to the capacity of the machine. This machine has given us absolute satisfaction without any breakdown during the nine years we have used it'."

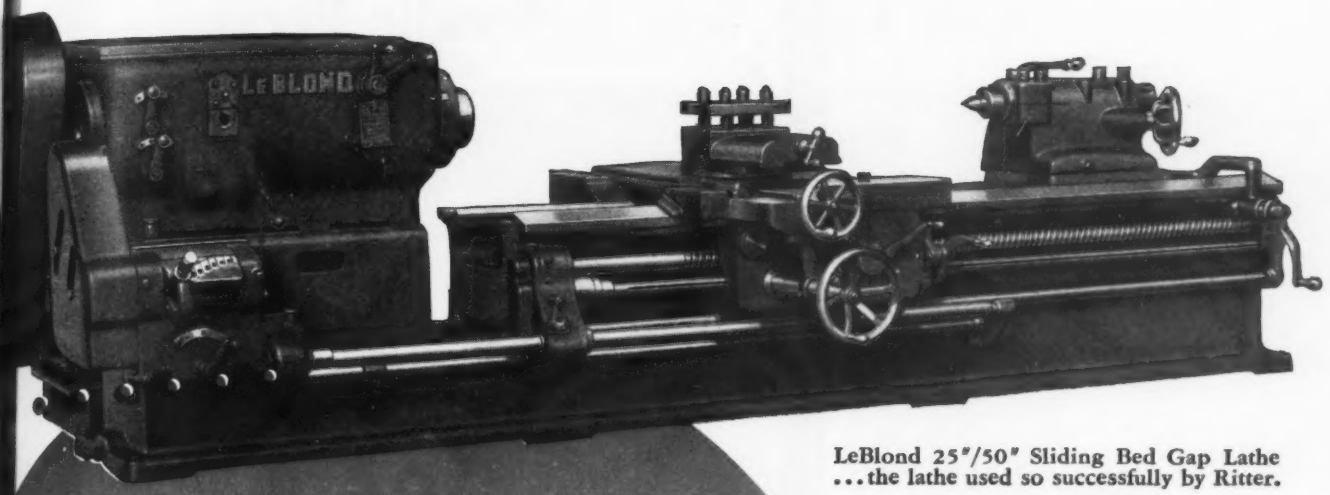


J. C. WHITNEY, JR.,
J. C. Whitney Mach. Co.,
Cleveland, Ohio

"I think one of the best things that can be said about a lathe is 'used profitably by Bendix-Westinghouse!' And that's the story of our No. 1 Crankshaft Lathe, here at the BENDIX-WESTINGHOUSE Automotive Air Brake Company, in Elyria, Ohio. That No. 1 is making a name for itself!"

CLEVELAND

Industry's Story in...



LeBlond 25"/50" Sliding Bed Gap Lathe
...the lathe used so successfully by Ritter.

H. M. EULER, JR.,
Harry M. Euler Co.,
Portland, Oregon

PORTLAND

"Our town has a reputation for craftsmanship that's putting us up on the list of production centers. And I find that we have the lathes Portland men want for all-around good work. Men like MR. D. M. LIEBHART, the Portland pump manufacturer in this picture. Mr. Liebhart's two Regals are never idle."

These LeBlond Agents and many others . . . one of them near you . . . know metal turning as few men know it. Since they offer the largest line of lathes available from one manufacturer, their unbiased advice on the selection of a lathe for any specific use can be relied upon.

The R. K. LE BLOND MACHINE TOOL COMPANY
CINCINNATI 8, OHIO

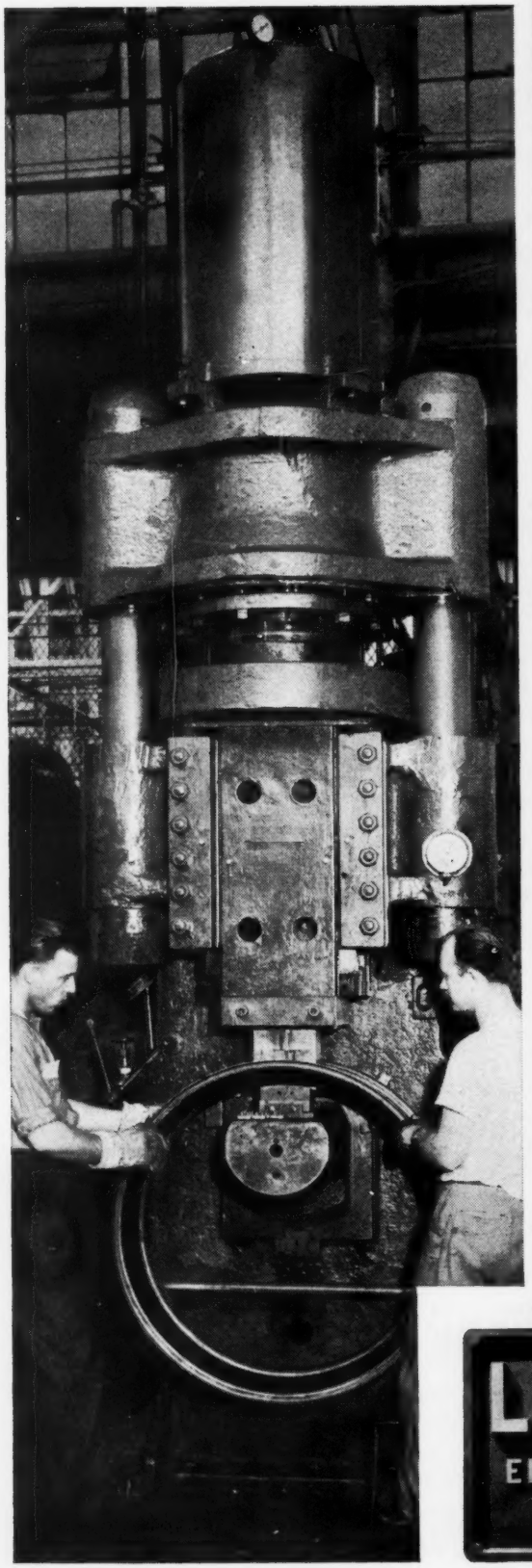
NEW YORK 6, Singer Bldg., 149 Broadway, COrtlandt 7-6621-2-3

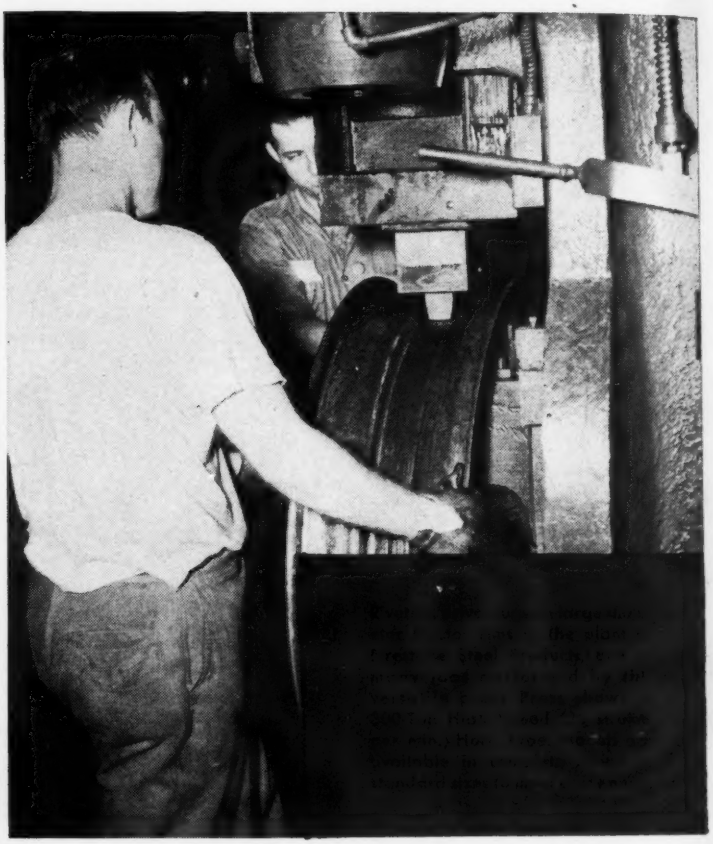
CHICAGO 6, 20 N. Wacker Drive, STA 5561

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES

"Quality Improved beyond Expectation"

...with Lake Erie Hydraulic Press





The Firestone Steel Products Division of Firestone Tire and Rubber Company not only report "quality improved beyond expectation" but list these additional advantages of the Lake Erie Hydraulic Press illustrated—

1 Increased production
2 Lower production costs
3 Reduction in rejects
4 Saving in floor space
5 More even flow of production

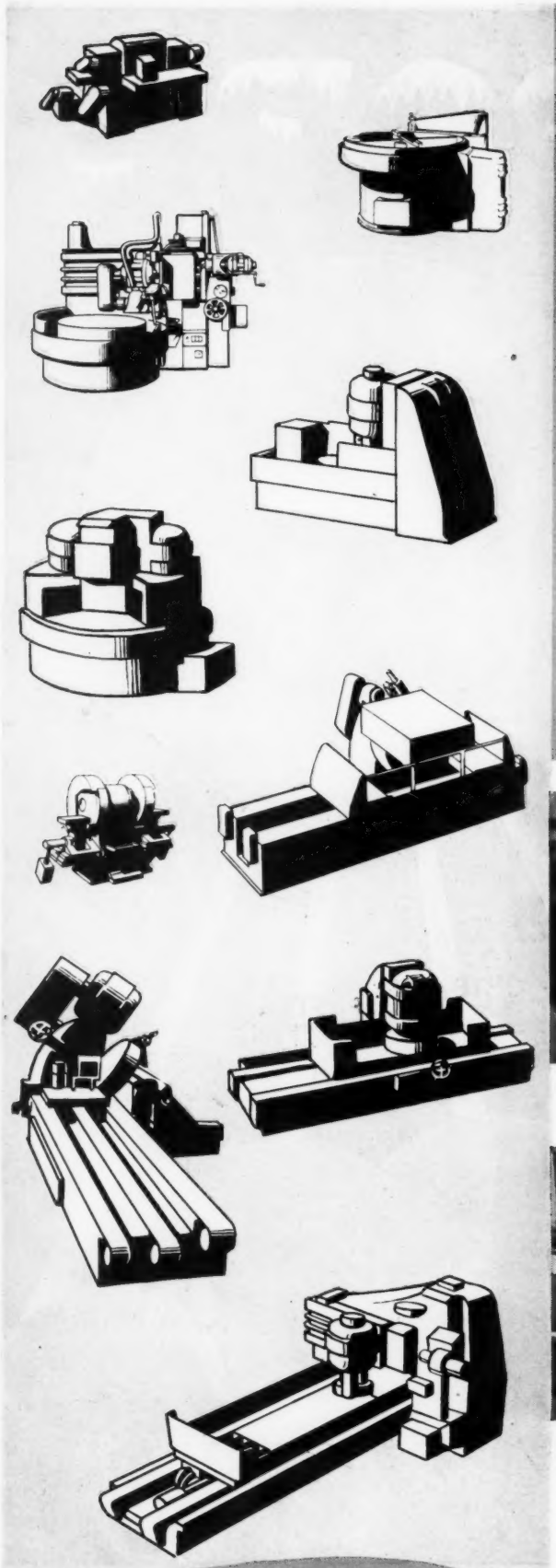
These experiences of Firestone Steel Products are typical. For in hundreds of metal working plants, Lake Erie Hydraulic Presses are improving quality, increasing production and decreasing manufacturing costs. It will pay you to investigate the advantages of Lake Erie Hydraulic Presses for your plant. Our engineers will be glad to assist you . . . without obligation.

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.
170 Woodward Avenue, Buffalo 17, N. Y.
Offices in Principal Cities and Foreign Countries

● Leading manufacturer of hydraulic presses—all sizes and types—metal working...processing...plastic molding...rubber vulcanizing...stereotyping...special purpose.

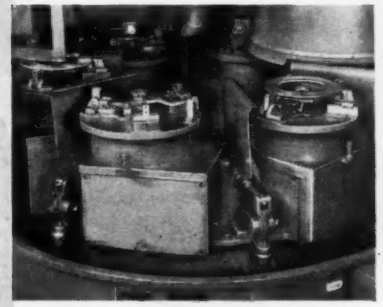
These BAY STATE abrasive products, manufactured with large pore spaces are especially suitable for SURFACING and TOOL and CUTTER jobs that require extra coolness of cut and heavy, fast removal of metal.
Our sales and distributor representation is located in nearly every principal city. Let them, and us, solve your grinding problems.
BAY STATE
Top Performance Consistently Duplicated
BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.



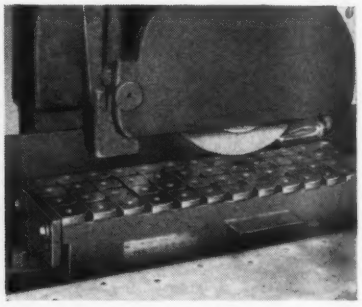
LAMINATED MAGNETIC CHUCK

Laminations extend complete width of chuck permitting use of 22% more magnetic holding surface. Magnetic poles, transverse to working force, increase holding power and lessen danger of slippage. Coils are embedded in a moisture-proof plastic seal inside the chuck body. A metallic gasket plate is double insurance against seepage of coolant into chuck body. Terminal box is fully sealed. Available in a wide range of sizes suitable for most flat surface machining.

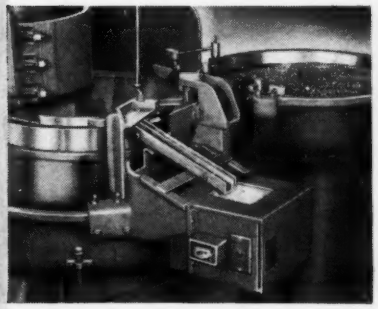
FIXTURE



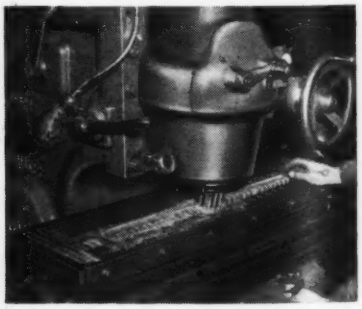
1. Facing automotive clutch pressure plates. Each chuck rotates independently as table rotates.



2. Chuck may be loaded to edges as holding power is uniform over entire plate surface.



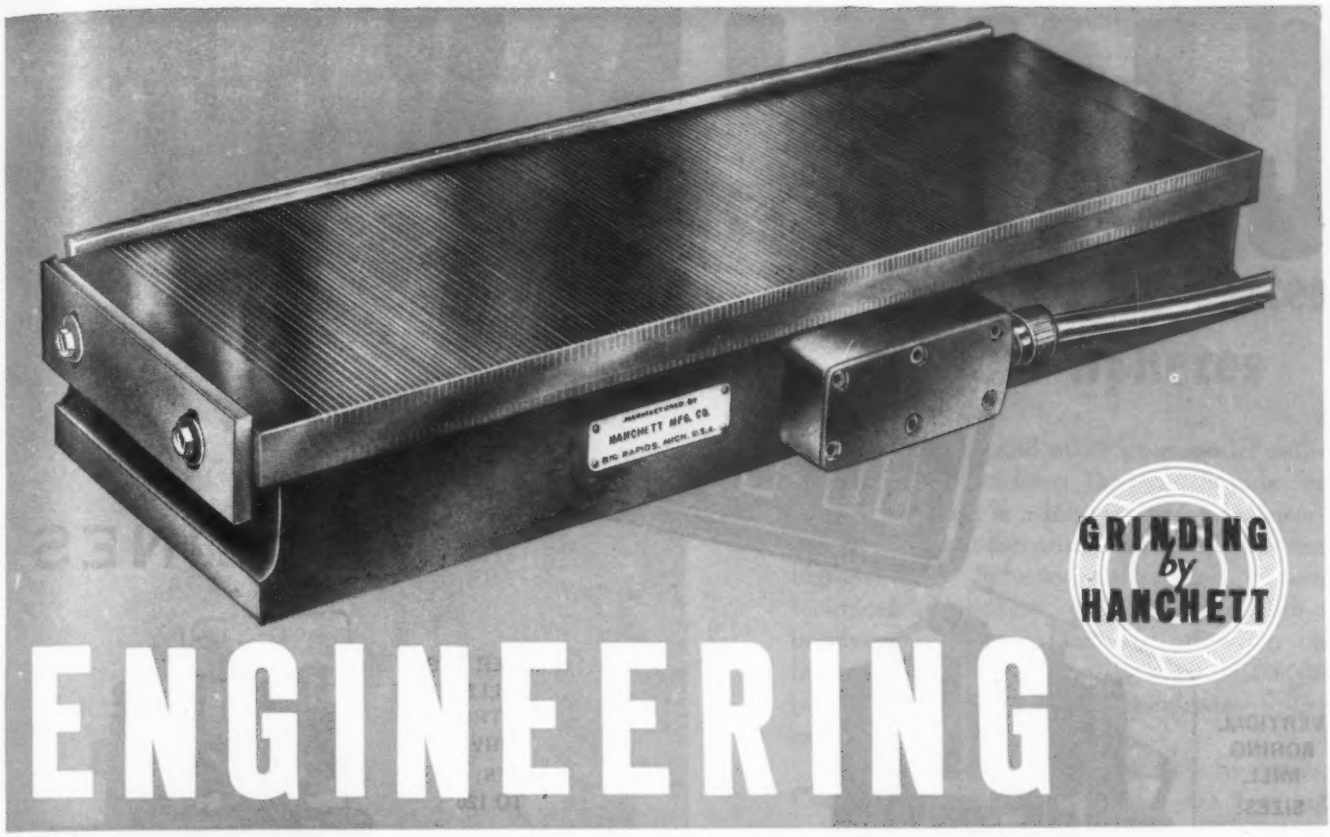
3. Rotary magnetic chuck enables this machine to finish seventy-five 7/16" castellated nuts, top and bottom, per minute.



4. Vertical milling operation facilitated with magnetic chuck. Triple-sealed unit is not affected by coolant.

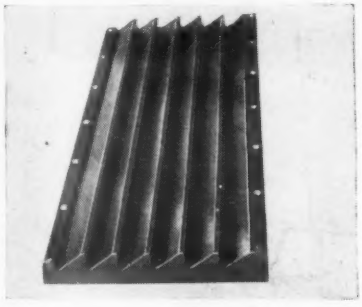
Because Hanchett builds 50 types and sizes of grinders, you are assured of unbiased recommendations when you bring your machining problems to us.

Our engineers will design and build any combination of magnetic and mechanical fixtures for best production, finish and economies with Hanchett Grinders.

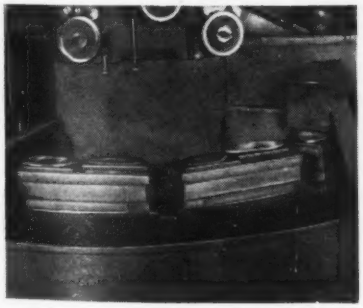


GRINDING by HANCHETT

ENGINEERING

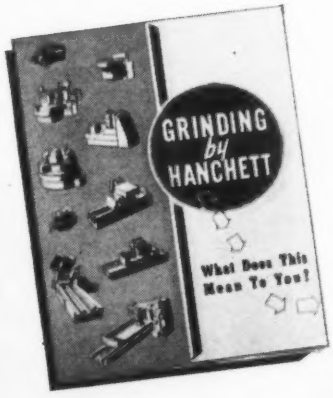


5. Auxiliary magnetic plate permits grinding six shear blades at one operation.



6. Grinding 600 electric iron sole plates per hour, held by contoured plate on magnetic chuck.

HANCHETT GRINDERS PLUS HANCHETT ENGINEERED FIXTURES ARE YOUR GUARANTEE OF INCREASED PRODUCTION AT LOWEST POSSIBLE COST...



Write us today. Ask for booklet M-106. For complete details on all Hanchett Grinders, request new 20 page bulletin 190.

If you have a problem of more per-hour-output, if you require precision finishes at lowest possible unit cost, consult our representatives on the advantages of Hanchett grinding. Combining the largest line of grinders and magnetic chucks with over fifty years of grinding engineering experience, Hanchett offers you this *extra-value* service that means *extra profits* for you. Whatever your present machining method—whether your parts are being designed or are in production—check on GRINDING by HANCHETT.

Hanchett's complete line of Hermeti-Coil electro-magnetic chucks—rectangular, rotary, revolving types—offers more capacity and holding power for a wide range of machining operations.

IF IT'S A FLAT SURFACE—THERE'S A HANCHETT TO GRIND IT

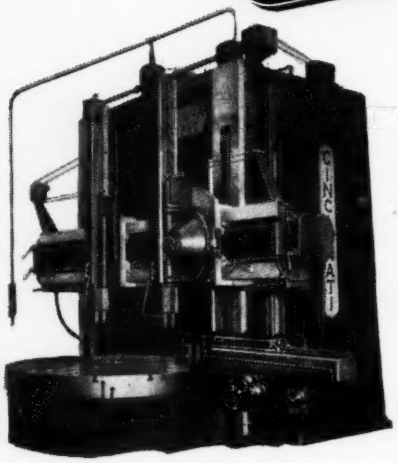
HANCHETT
MANUFACTURING CO.
BIG RAPIDS . . . . . MICHIGAN

CINCINNATI

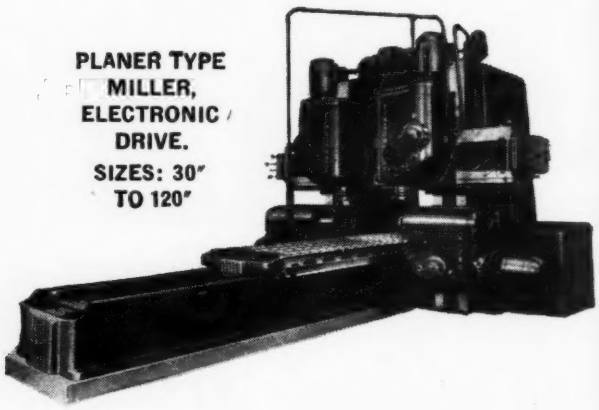
HYPRO

MACHINES

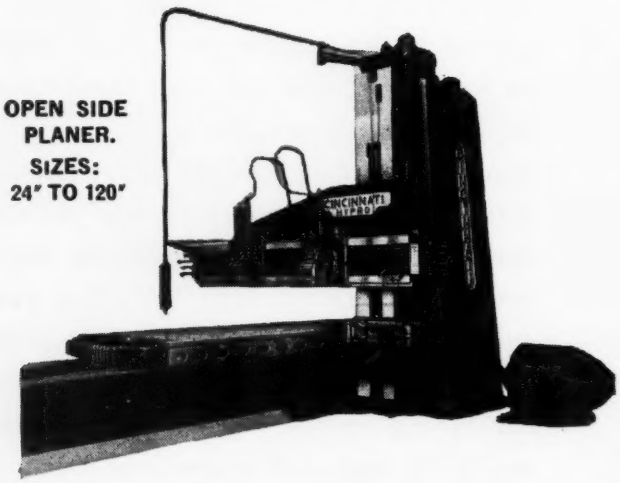
VERTICAL BORING MILL.
SIZES: 54″ TO 12′



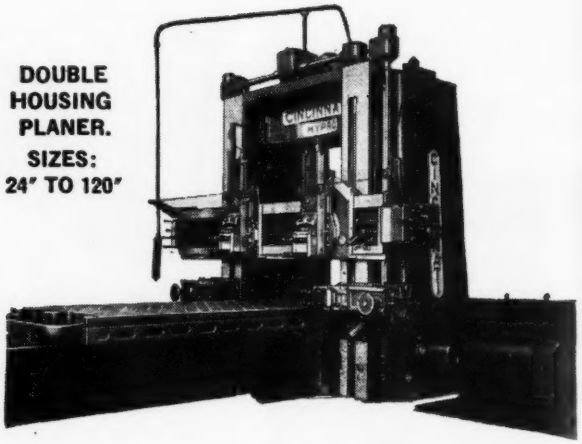
PLANER TYPE MILLER, ELECTRONIC DRIVE.
SIZES: 30″ TO 120″



OPEN SIDE PLANER.
SIZES: 24″ TO 120″



DOUBLE HOUSING PLANER.
SIZES: 24″ TO 120″

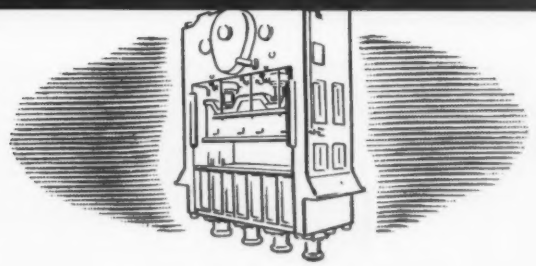


HYPRO IS SHORT FOR HY-PRODUCTION AND A SHORT CUT TO HIGH EFFICIENCY

THE CINCINNATI HYPRO PLANER COMPANY

PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO



Cold Forming 3/4" Plates for 10'6" Spheres

To hold propane and other gases under sufficient pressure to keep them as liquids for compact storage is a job calling for engineering—and manufacturing facilities—of the highest order. Spherical tanks have certain technical advantages, but their production involves an exacting forming operation on heavy plates—flange quality steel of 55,000 p.s.i. tensile strength, .75" minimum thickness, and 101 inches square.

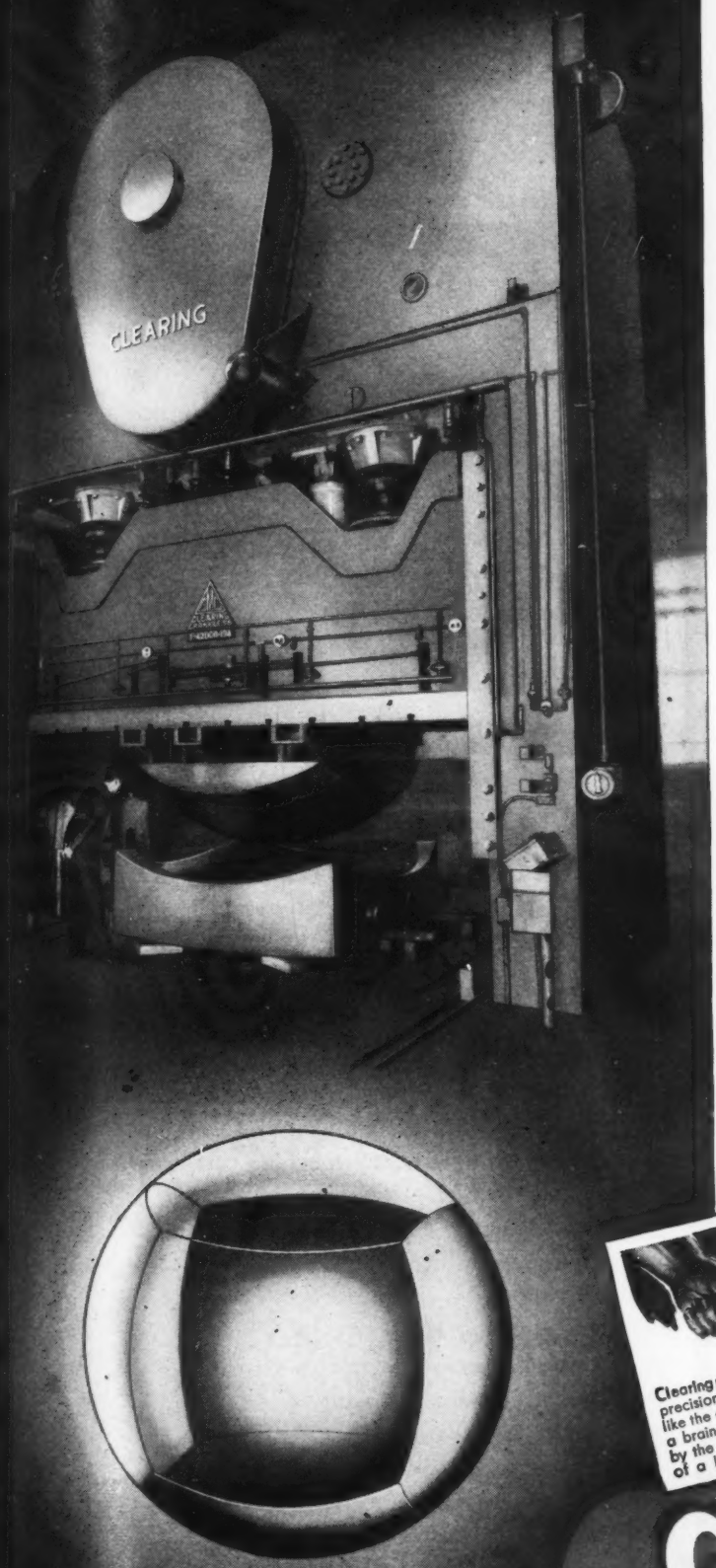
The Commercial Shearing and Stamping Company, Youngstown, Ohio, are forming such plates on the Clearing press (2,000 tons capacity) shown in the illustration. The six finished segments to make a complete sphere are assembled with only 78 lineal feet of weld. The result saves more than 35% of the material needed for a cylindrical tank to provide equal capacity.

Clearing presses have long played an important part in the production of better items at lower costs, because Clearing makes engineering dreams come true. If you need a huge press of tremendous strength, Clearing can provide it. With small presses or large, if your work demands extreme precision, unusual flexibility of control, high operating speeds or special cycling—Clearing has the answers.

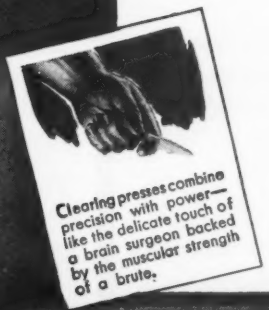
If you want to do something that has never been done on a press before, you will find kindred spirits, well fortified with experience, at Clearing.

It will pay you to consult Clearing on your prospective production problems. There is no cost or obligation involved in doing so.

This 2,000-ton Clearing mechanical press has a 30" stroke, and operates at either 1 or 3 strokes per minute. Bed area is 96" x 194"; shut height is 60". Four double 32" cushions with 15" stroke (below the floor level in the picture) give a total cushion capacity of 321 tons. Four 16" locking devices and pneumatic flywheel brake are also part of the equipment.



Segments are formed as shown in the photo, then flame beveled for welding into a complete sphere of 126" inside diameter. Each individual segment as it comes from the press weighs nearly a ton.



Clearing presses combine precision with power—like the delicate touch of a brain surgeon backed by the muscular strength of a brute.

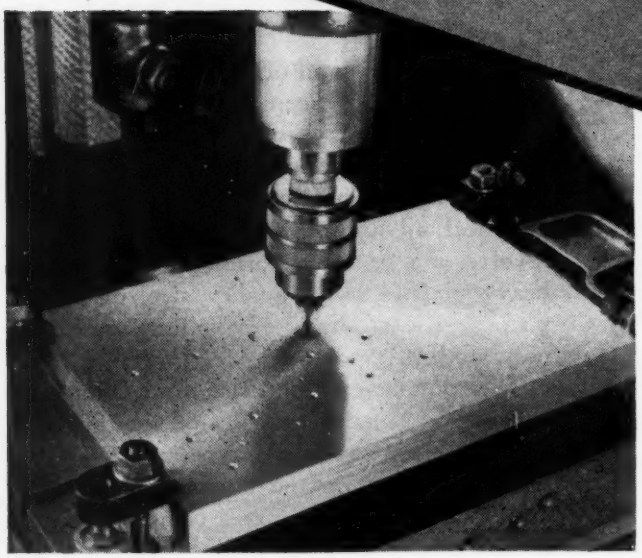
CLEARING

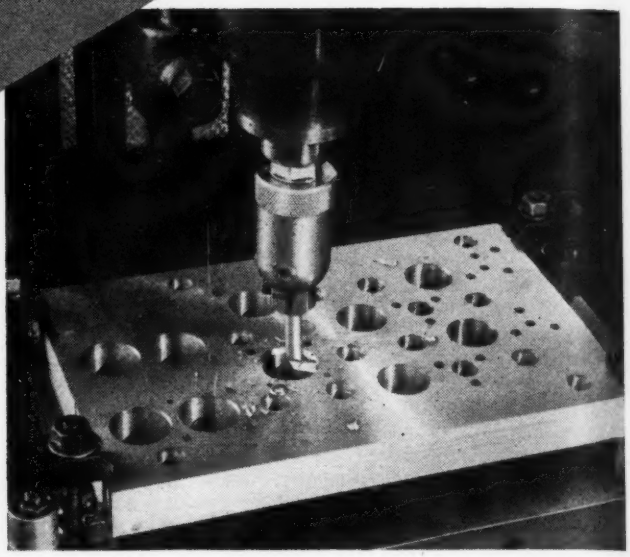
THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS

HOW TO OBTAIN *increased speed* AND *closer tolerances* IN JIG BORING





NO S-T-O-P and S-T-A-R-T TO CHANGE TOOLS AT EACH HOLE

In the Moore Jig Borer you can *consecutively* spot, drill, bore and ream *all* holes in the work-piece with minimum tool changes. In other words, you don't have to change tools at individual holes for each operation, because there are no size blocks or end measures to labor over.

Accurate lead screws *built into* the Moore Jig Borer enable you to make table settings faster than you can change tools. A glance at your blueprint—a few turns of the micrometer dials and the work is set to precise location. Moore lead screws, accurate to .0002″ over 14″ of travel and .00005″ in any given inch see to that. Another advantage—you make each setting three times, enabling you to quickly notice and correct any errors you may have made.

The Moore Jig Borer is ideally suited for jigs, fixtures, dies, special machine parts and jig-less, small-lot production. It is highly sensitive for holes 1/32″ diameter, yet rugged for heavy cuts up to 4½″.

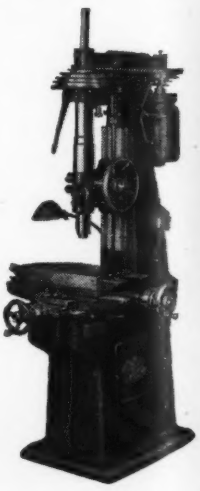
RAPID TABLE SETTINGS PROMOTE GREATER ACCURACY IN FINISH BORING

Rapid table settings on the Moore Jig Borer encourage operators to follow the best toolroom practice—roughing *all* holes before finish-boring *any* of them.

Moore lead screws are so fast to set—faster than tool changes—that it *pays* to pre-rough all holes. Temperature changes or stresses caused by roughing cuts *cannot* interfere with finish-boring.

After roughing, the set-up can be easily checked and re-set before taking any finish cuts.

All finish-boring is completed without stressing or heating of the work-piece. These favorable conditions, maintained throughout the entire finish-boring operation, on the Moore Jig Borer, are further assurance of ultimate accuracy in the completed work.



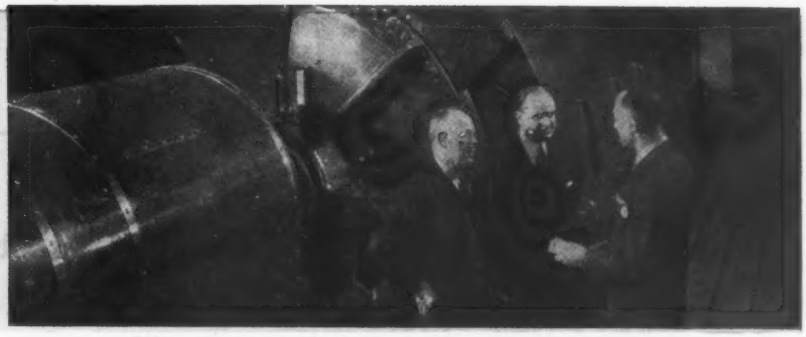
Write today for descriptive literature

MOORE TOOLS

MOORE JIG BORER

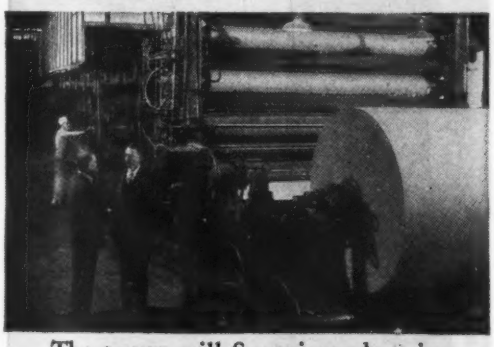
MOORE SPECIAL TOOL CO., INC., 734 UNION AVE., BRIDGEPORT 7, CONN.

Over 200 railroads in the United States use Gulf lubricants and fuels —and get the benefit of the co-operative service extended by Gulf's trained lubrication engineers.



The recommendations and practical suggestions of Gulf Lubrication Engineers are adopted by scores of leading power plants in 30 states from Maine to New Mexico.

Gulf Lubrication Engineers consult regularly with textile mill officials and operating men to help insure efficient production and low maintenance costs.



The paper mill Superintendent in the picture says, "We get greater tonnage and keep maintenance costs down by following Gulf Engineering recommendations."

Gulf Lubrication Engineers are welcome visitors in hundreds of coal mines as they make their periodic calls to insure efficient lubrication and lower operating costs.

Adopt

Gulf Periodic Consultation Service

to insure efficient lubrication the year-round, lower costs—

HERE are two easy steps you can take to help keep your plant up to maximum efficiency: Call in a Gulf Lubrication Engineer and let him work with your operating and maintenance men to install improved lubrication practice; then adopt Gulf Periodic Consultation Service to insure efficient lubrication the year round.

After you adopt this practical, money-saving plan, a trained Gulf Lubrication Engineer will make periodic service calls at your plant. He will make additional recommendations to meet changed conditions and keep your plant men informed on latest developments in lubricants and application methods. At all times he will seek to further improve your lubrication practice, increase production, and reduce costs.

Act now to get the many benefits that can be obtained through Gulf Periodic Consultation Service. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

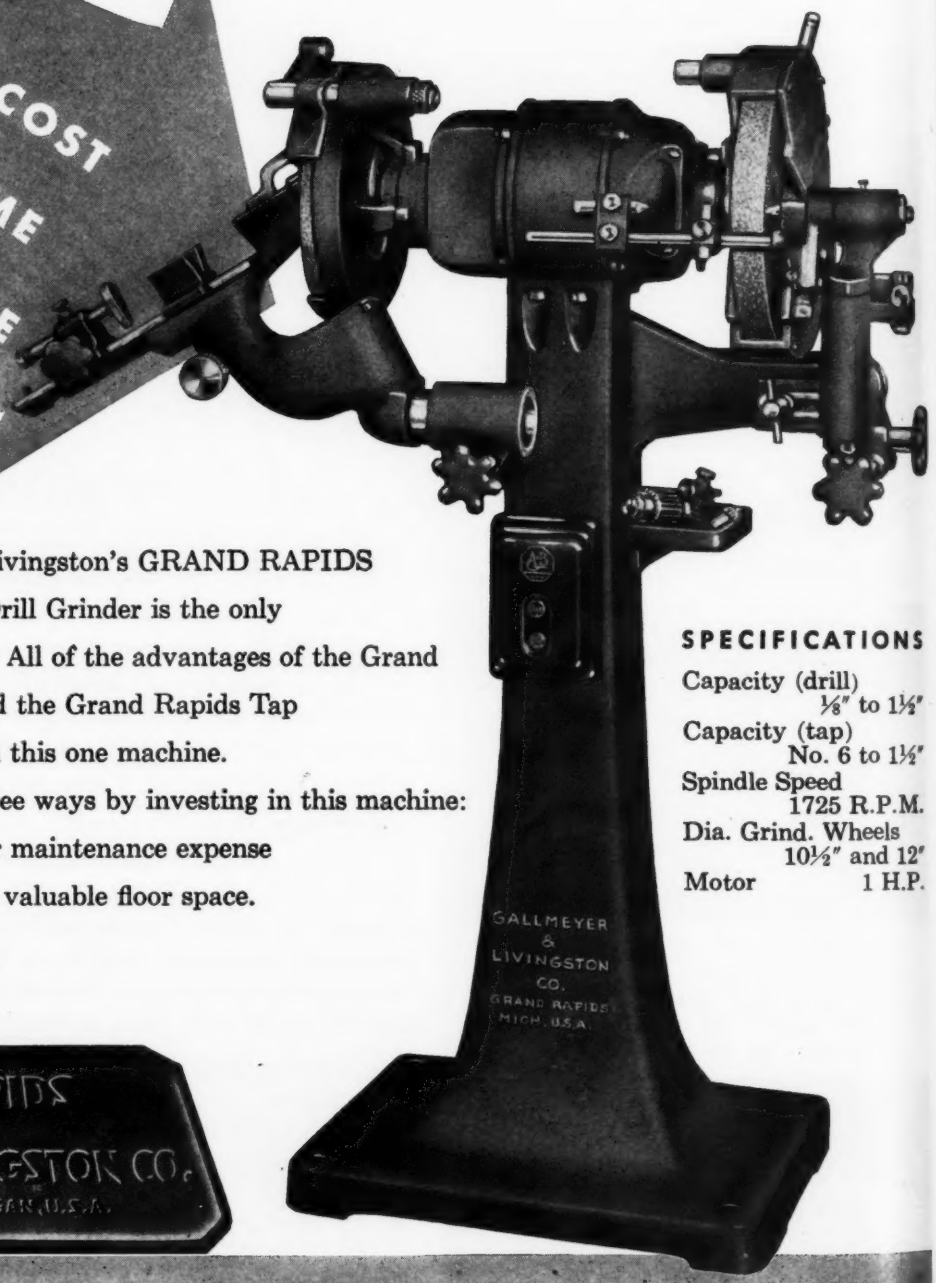
GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

TWO JOBS IN ONE!

with GRAND RAPIDS combination tap and drill grinders

AT LESS COST
IN LESS TIME
IN LESS SPACE



Gallmeyer & Livingston's GRAND RAPIDS Combination Tap and Drill Grinder is the only machine of its type. All of the advantages of the Grand Rapids Twist Drill Grinder and the Grand Rapids Tap Grinder are combined in this one machine.

You save three ways by investing in this machine: On first cost, on lower maintenance expense and on valuable floor space.

Write for Bulletin G.L. 9-15-44

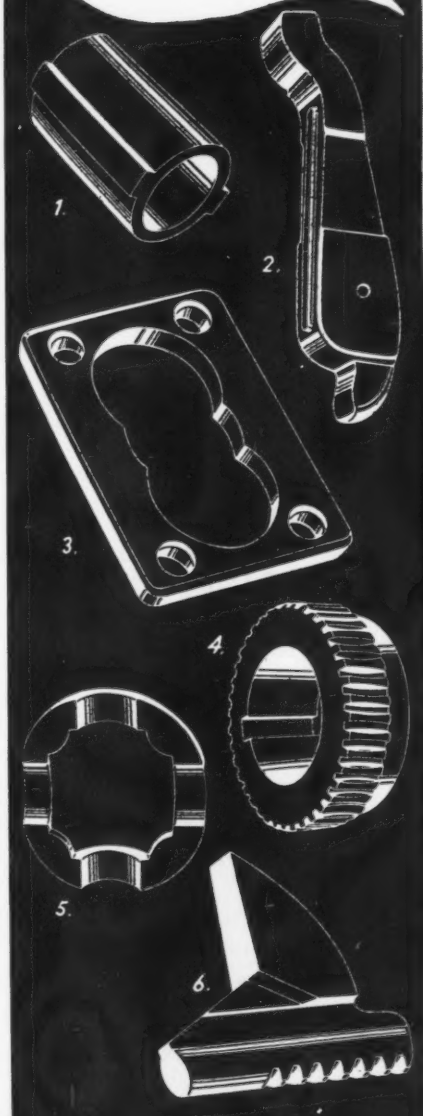
SPECIFICATIONS

Capacity (drill)	⅛" to 1½"
Capacity (tap)	No. 6 to 1½"
Spindle Speed	1725 R.P.M.
Dia. Grind. Wheels	10½" and 12"
Motor	1 H.P.

What "GRAND RAPIDS" Quality Means: Gallmeyer & Livingston cast their close-grained gray iron, machine to micrometric tolerances, precision-assemble grinding machinery of unsurpassed performance. *Grand Rapids* means *top* quality in grinding machinery.

GALLMEYER & LIVINGSTON CO., 305 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

TYPICAL
BROACHING
JOBS THAT
Cut Costs
PARTS
YOU PRODUCE
MAY BE
SIMILAR !



1. Double integral key bushing for change gears.
2. Pawl
3. Gear pump center plate
4. Aircraft gear
5. Half Universal joint
6. Adjustable wrench jaw

CASE HISTORY
WASHING MACHINE GEAR SEGMENT

Segment broached from solid. Cutting 13 involute teeth of 10 pitch, 20° pressure angle, tooth depth .216" must be properly located from center hole and angularly positioned from ½" hole at periphery.

Production Rate Increased **500%** BY BROACHING

BEFORE
COMPLETED
BEING BROACHED
Simple fixture holds part to extreme accuracy. Unnecessary to remove broach while loading.

BROACHING means SPEED, ECONOMY, PRECISION

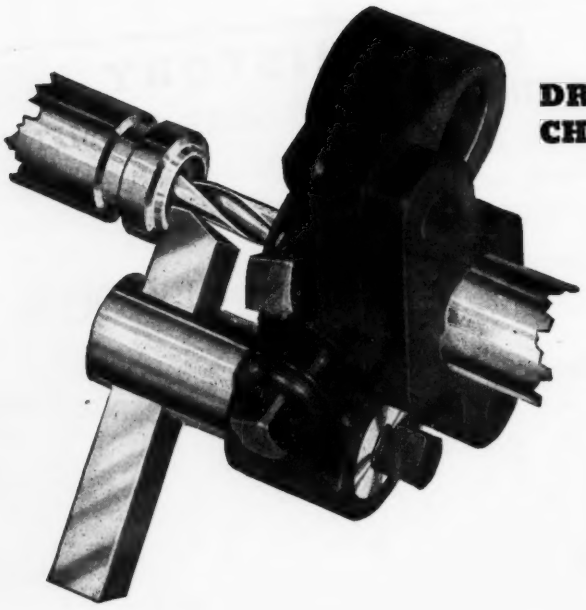
If a part can be machined by the conventional methods of milling, drilling, shaping, etc., it can usually be broached — cheaper, faster, and with equal precision.

If you're planning ways to cut production time and costs, it will pay you to let LAPOINTE engineers show you what LAPOINTE broaches and broaching machines can do for you.

THE *Lapointe*

MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS · U.S.A.

OLDEST AND LARGEST MAKERS OF BROACHES AND BROACHING MACHINES



DRILLING and CHAMFERING

TURNING RADIUS while DRILLING and BURNISHING

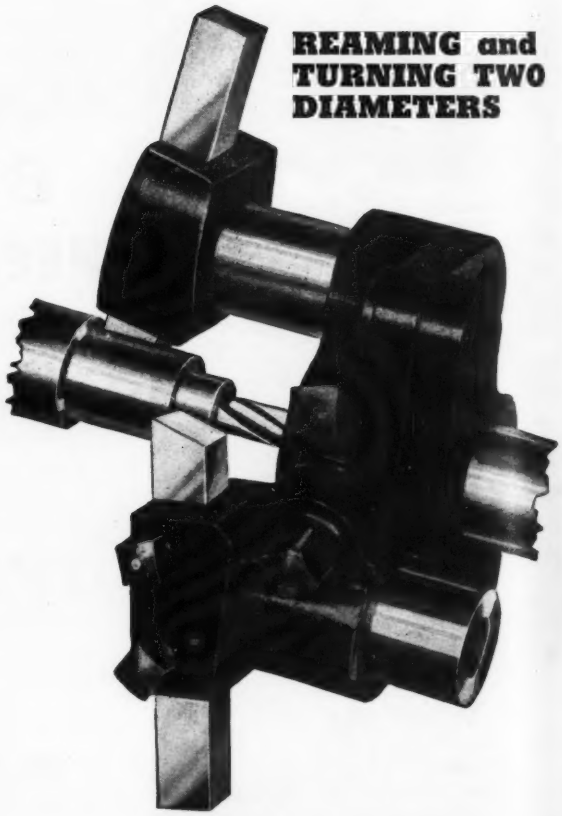
DO JOBS LIKE THESE "ON THE DOUBLE" WITH R AND L TOOLS

When you put R and L Turning Tools on your turret lathes or screw machines you get "double-quick" production . . . because these simple, practical tools actually double (or triple) the capacity of each spindle or turret face!

Operations like those shown are typical of the scores of jobs which can be quickly set up — and quickly performed—with R and L Turning Tools. Combinations of two or three operations such as boring, drilling, reaming, facing, burnishing, chamfering or centering can be performed simultaneously. And, because of this R and L multiple operation feature, a high degree of concentricity is easily obtained. In addition to this time-saving multiple operation feature, the single, simple R and L Turning Tool replaces a dozen or more separate tools, and can be changed in ten seconds from right- to left-hand operation.

Built in five sizes to cover a wide range of jobs, R and L Turning Tools are constructed of heat-treated alloy steel, with all essential parts precision ground to provide accurate alignment. Complete details, plus illustrations of many more operation suggestions, are contained in the idea-packed R and L Booklet. Write for your copy.

REAMING and TURNING TWO DIAMETERS



R AND L TOOLS

1825 BRISTOL STREET

NICETOWN — PHILADELPHIA 40, PA.

Save Time

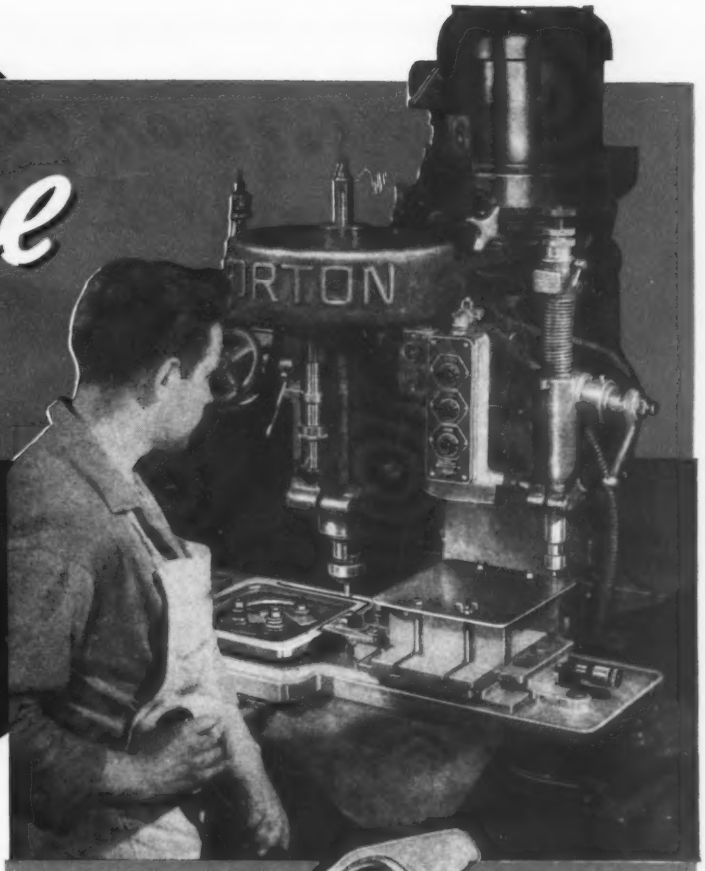
ON SHORT RUN MILLING OPERATIONS

by tooling your work on a

GORTON

with

Tracer Control



TRACER CONTROLLED MILLING IS ... SIMPLE ... FAST ... ACCURATE

This illustration shows just one of many applications of tracer control as applied to milling. Gorton tracer controlled equipment includes Duplicators, Pantographs and Electric Arc Etchers for milling, engraving, etching and many other metal removal operations.

Simplicity of operation, high spindle speeds and precision are built-in Gorton characteristics which enjoy enthusiastic approval among thousands of Gorton users throughout the world. It will pay you to investigate Gorton Tracer Control now.

GORTON PRE-DETERMINES RESULTS for YOU

Send us complete description with prints of one of your jobs. Our Engineering Department will send you a production estimate on the same job tooled on Gorton tracer controlled equipment—no obligation.

JOB FACTS

1. NAME OF PART—*Packaging Machine Cover*
2. MATERIAL—*Cast Iron*
3. MACHINE—*Gorton 9-J Duplicator*
4. OPERATION—*Mill Gasket Groove—10 in lot*
5. ACTUAL CUTTING TIME—*4½ Minutes each*
6. CUTTING TOOLS—*Gorton End Mill—10 Pieces per Sharpening*

WRITE TODAY FOR THIS BOOKLET

Bulletin No. 1655 will give you complete information on all Gorton tracer controlled machines . . . what they are . . . what they do . . . how they operate. It's yours for the asking.

GEORGE GORTON MACHINE CO.

TRACER CONTROLLED MILLING

1310 RACINE STREET • RACINE, WISCONSIN

From here on, you can adapt it to your Exact needs

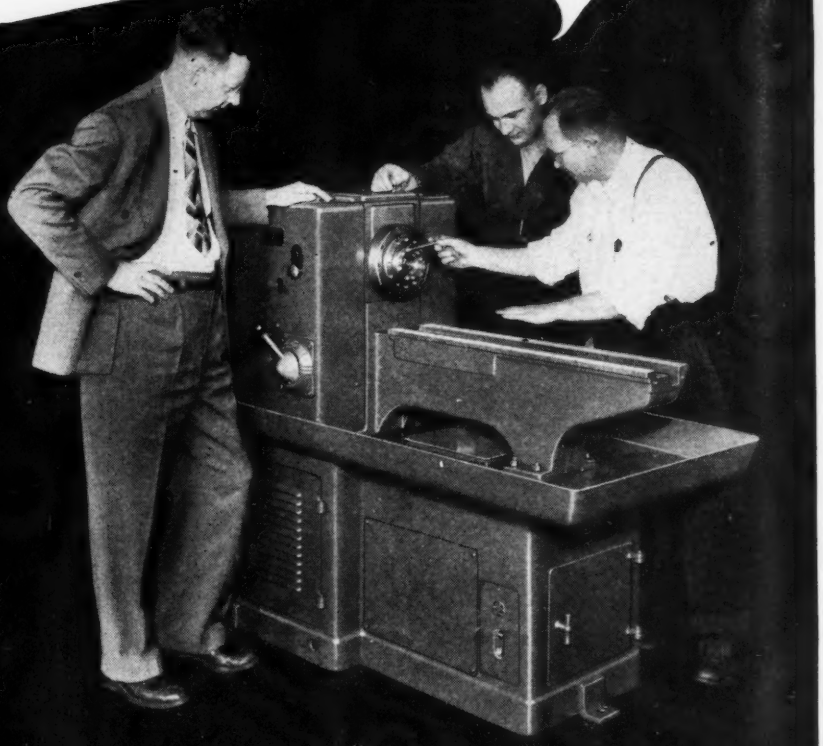
OSTER

NO. 601

"RAPIDUCTION"

TURNING MACHINE

Gives wide Latitude for Specific Applications



From the floor up to the ways and the spindle, the Oster No. 601 "RAPIDUCTION" is a basic, SIMPLIFIED turning machine.

From here on, you can get *exactly* what you want to adapt the machine to *YOUR specific needs*. The advantage is that the larger part of the machine is *STANDARD* with the resultant economy of a standard chassis; the equipment may be *either* special or standard with automatically indexed 6-position turret or a plain saddle with single tool post. Lever feed or screw feed cross slides can be furnished also.

Any way you look at this *"basic machine* proposition" it spells ECONOMY and EFFICIENCY in capital letters. Optional *Worm Drive* or *Direct Drive* and optional 4-speed or 2-speed motor in the basic machine give you still wider selectivity. If *seriously* interested, write . . .

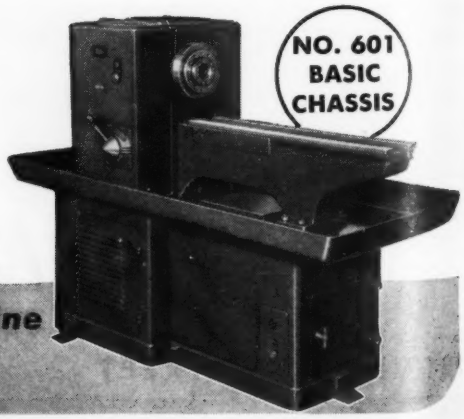
THE OSTER MANUFACTURING CO.

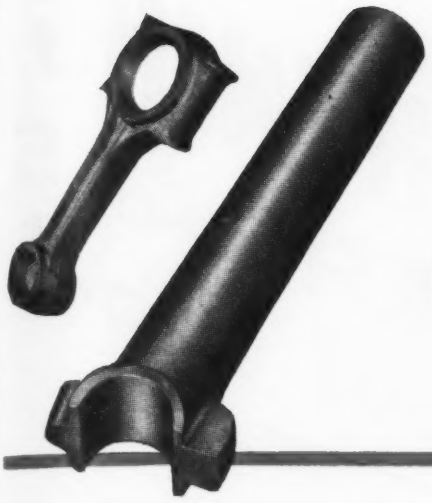
2073 East 61st Street • Cleveland 3, Ohio, U.S.A.

OSTER

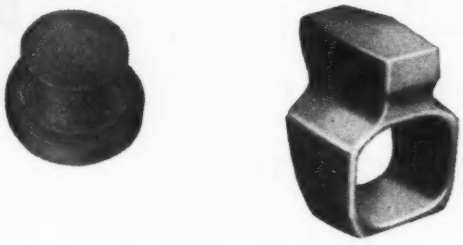
"Rapiduction"

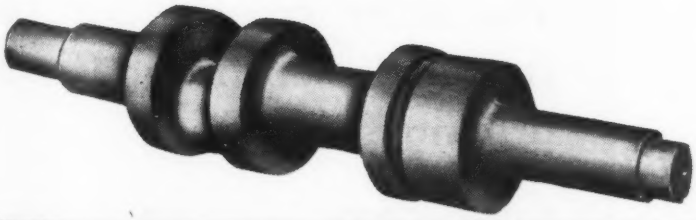
The STANDARD *Turning Machine* with CUSTOM-BUILT *Features!*





Today's Machines need BETTER FORGED PARTS





Competition demands that today's machines and equipments be better — from the standpoints of dependable performance, service life and immunity from breakdowns. These objectives are readily attained through the broader use of durable forged parts. Too, forgings effect important production economies by savings in machining processing and assembly time.

Dependable Performance

Forgings provide metal at its ultimate strength and toughness, with maximum resistance to tensional, torsional and compression stresses, and high resistance to impact and shock loads. The use of forgings for the stressed parts of every machine assures the inbuilt strength quality which underlies dependable operation.

Long Service Life

Forgings embody the highest obtainable fatigue resistance — the determining factor in the ultimate life of machine and equipment parts which are subjected to repeated stresses in continuous service. Every step in the forging process adds something to the inherent toughness which enhances the useful life of the part.

Freedom from Breakdowns

The greater strength of forgings makes their liberal use the soundest possible insurance against breakdowns, down time for repairs and high maintenance costs — important considerations for machine designers in this competitive age. An increased factor of safety is a natural by-product.

Production Advantages

Forgings generally require less time to machine and finish, as the close tolerances obtainable with present day forging and cleaning methods leave a minimum of metal to be removed, resulting in lower machining and tooling costs. Weight is saved through the greater strength of forgings, which permits the use of thinner metal sections. Valuable space may also be saved.

Drop Forgings and Dies are Now Available

Kropp Forge, for the first time in many years, is now able to offer immediate production of drop forgings, including complete die-making facilities. Our die sinkers who made dies for millions of military forgings are available to you — today.

When you need flat die, drop or upset forgings, contact your nearest Kropp engineering representative, or send blueprints direct for immediate quotation.

Refer to Your Local Phone Directory for Kropp Forge Engineering Service In

Atlanta, Birmingham, Buffalo, Cedar Rapids, Chicago, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, New York, Portland, Rockford, St. Louis, St. Paul, San Francisco, Seattle, South Bend, Tulsa.
Canada: Montreal, Toronto, Vancouver, Winnipeg.

KROPP FORGE COMPANY
5301 W. ROOSEVELT ROAD
CHICAGO 50, ILLINOIS

KROPP

LIGHTNING REVERSALS without shock

Long Life of Taps, Accurate Depths and Class Three Fits can be had when you use LELAND - GIFFORD Reversing Motors for Tapping.

The same spindle can be instantly changed to a drilling spindle.

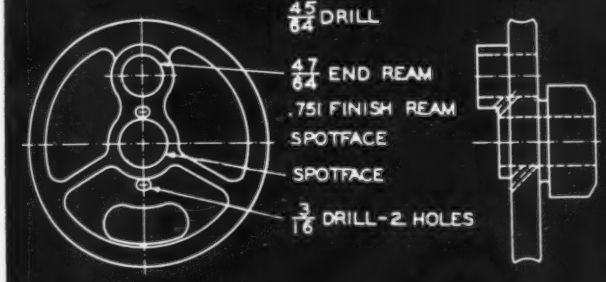
Bulletins 300B and 400A explain. Send for them.

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

HIGHER PRODUCTIVITY through the FLEXIMATIC METHOD*

A KINGSBURY AUTOMATIC INDEXING FLEXIMATIC*



MAKES THE PART—A CAST IRON WORM GEAR BLANK

COMPLETING 7 MACHINING OPERATIONS

IN 14.2 SECONDS

Higher second operation production of cast iron worm gear blanks was the immediate result of the application of Kingsbury multiple machining methods. The *Kingsbury Fleximatic* illustrated consists of eight *standard* Kingsbury drilling heads mounted on a *standard* Kingsbury base equipped with an eight station automatic indexing turret. In a single chucking, all indicated drilling, reaming, and spotfacing operations are completed. A single operator loads rough blanks, trips the machine, and the cycle begins. While the cutting units are working, the operator removes a finished part and reloads the work holder at his station. *The cycle is completed in 14.2 seconds.*

Such multiple machining performance can be duplicated on many parts, yet, because *Kingsbury Fleximatics* are assembled from standard units, you have a special purpose machine at much lower cost. It will pay you to investigate the high production capacity and unusual flexibility of Kingsbury Fleximatics. Let our engineers study your production problems; it does not obligate you.

WE PUT OUR HEADS TOGETHER TO CUT YOUR DRILLING COSTS

KINGSBURY MACHINE TOOL CORP.

KEENE, NEW HAMPSHIRE

Write for Bulletin **H**

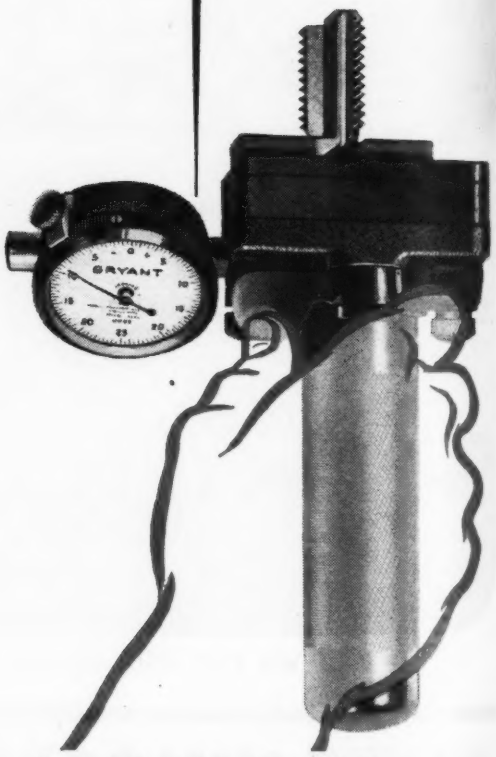
*** KINGSBURY FLEXIMATIC**

— a special purpose machine for combined automatic operations during a single chucking —the result of Kingsbury engineering ability in the use of low cost *standard* Kingsbury drilling and tapping heads on *standard* Kingsbury bases.

Another BRYANT Postwar Development

The new Bryant Portable Thread Gage offers a faster, more accurate inspection method for checking internal threads in large castings or parts still chucked in the machine. *It is the only gage which quickly and visually indicates internal thread size with master gage precision.* A glance at the large dial indicator immediately shows accumulated inaccuracies of pitch, lead, thread form and diameter or presence of burrs. The new portable — constructed on the same principle as the proven Bench model — is faster, simpler, and constantly accurate. There's no tedious threading, no feeling for fit, and none of the rapid taper wear that is encountered with conventional gages.

The new Bryant Portable Thread Gage brings to every corner of your plant a modern, foolproof, time-saving method for internal thread gaging. It will cut your inspection costs to a new low while adding speed to your production line. Write today for new bulletin giving complete details.



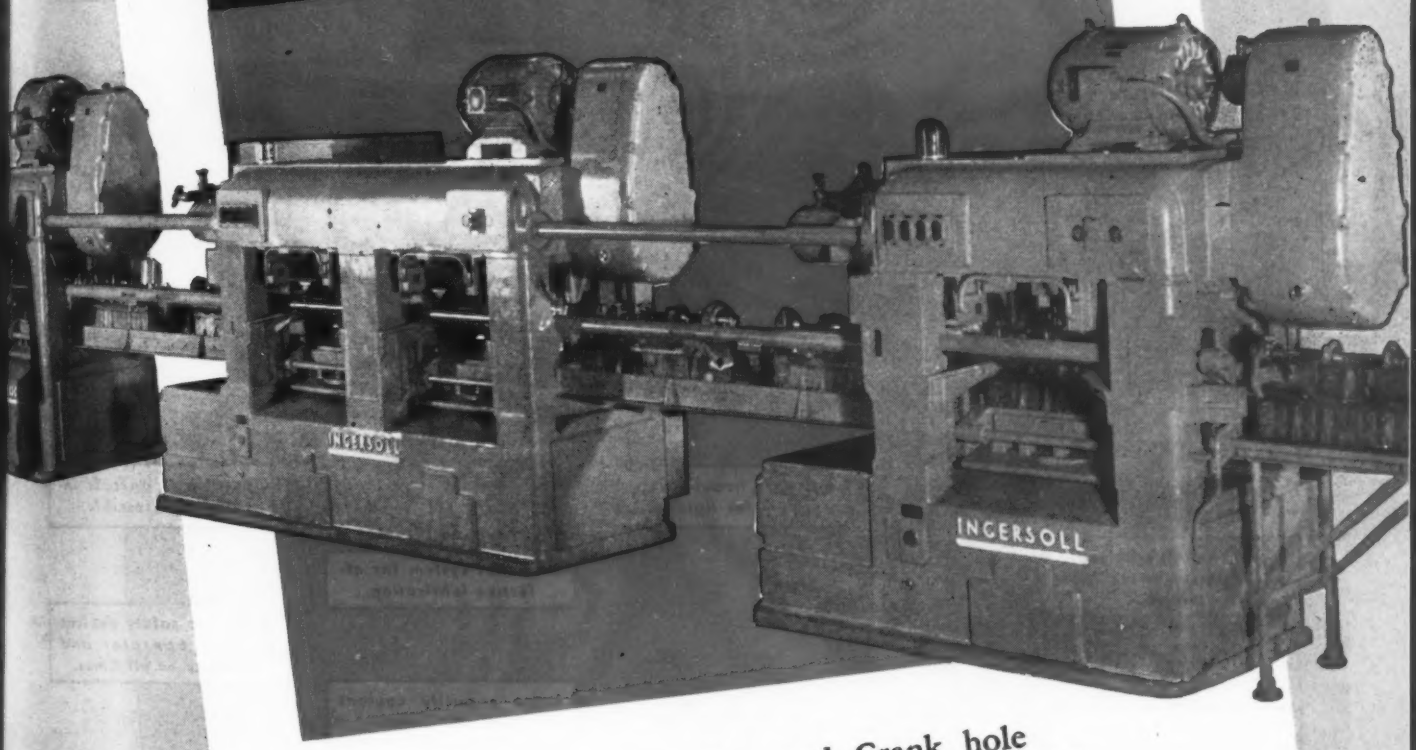
Bryant Portable Thread Gage
Also Universal Diameter Gage, Squareness of Face Units, Adjustable Thread Gage

BRYANT

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U. S. A.

PRECISION BORING

Accurate and Fast



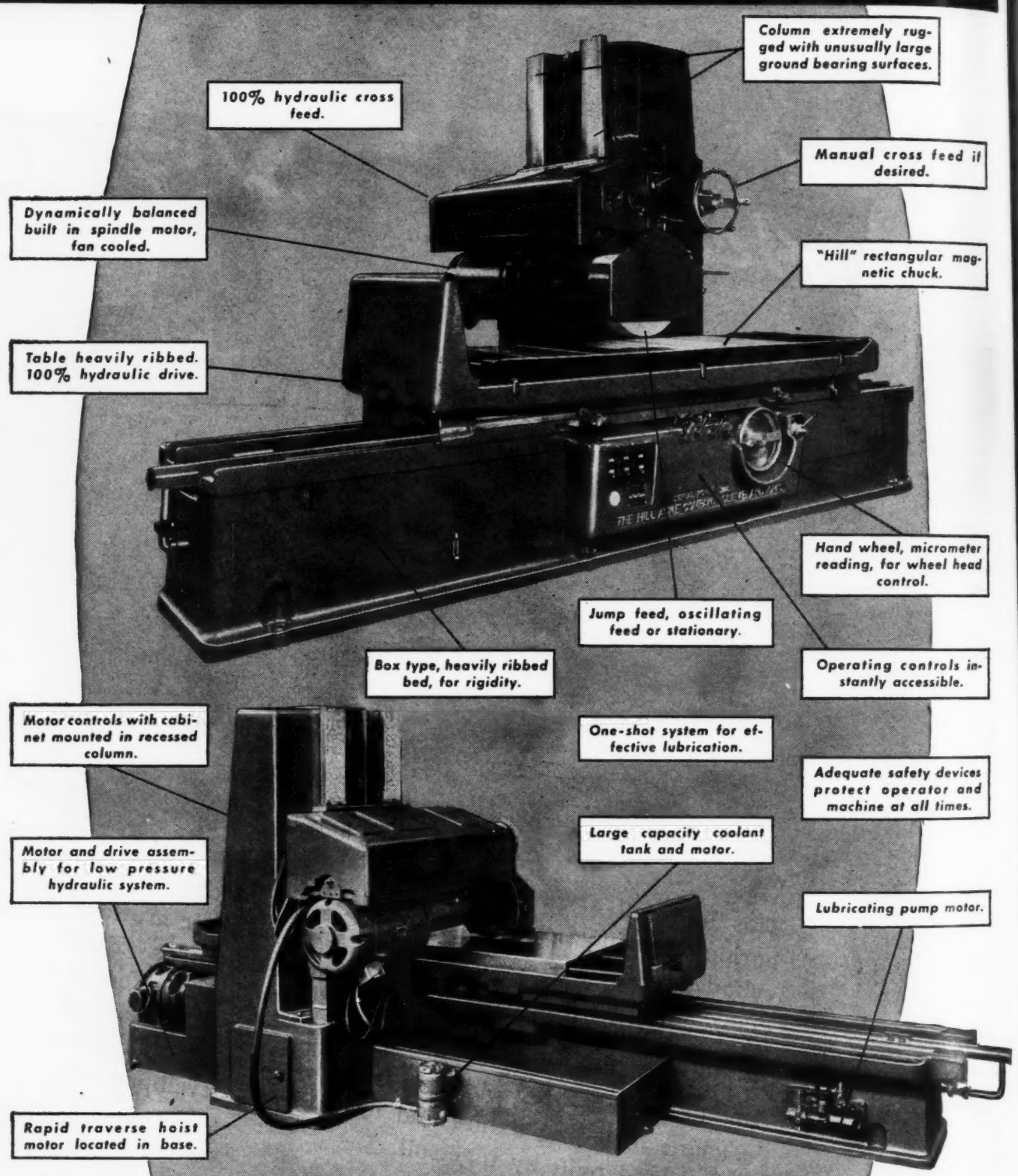
This Ingersoll 4-Station Cam and Crank hole boring machine bores at rate of 107 automobile cylinder blocks per hour . . . In each block there are four crank shaft bearing holes and four cam shaft holes. Each hole is rough bored, semi-finish bored, and finish bored within a limit of .0005″ plus or minus. The alignment of the bores must be within a limit of .00075″ . . . This machine including fixture and tooling was developed, designed, and built by Ingersoll.

INGERSOLL

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS

HILL SURFACE GRINDERS

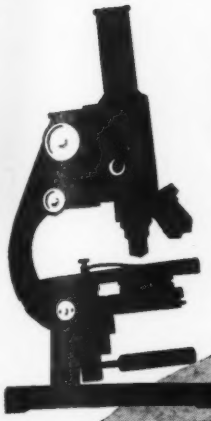
"Open Side" Horizontal Spindle Hydraulic grinders for heavy duty precision grinding. Also built in Vertical Spindle design and in a full range of table widths and lengths.


Column extremely rugged with unusually large ground bearing surfaces.
100% hydraulic cross feed.
Manual cross feed if desired.
Dynamically balanced built in spindle motor, fan cooled.
"Hill" rectangular magnetic chuck.
Table heavily ribbed. 100% hydraulic drive.
Hand wheel, micrometer reading, for wheel head control.
Jump feed, oscillating feed or stationary.
Box type, heavily ribbed bed, for rigidity.
Operating controls instantly accessible.
Motor controls with cabinet mounted in recessed column.
One-shot system for effective lubrication.
Adequate safety devices protect operator and machine at all times.
Large capacity coolant tank and motor.
Motor and drive assembly for low pressure hydraulic system.
Lubricating pump motor.
Rapid traverse hoist motor located in base.

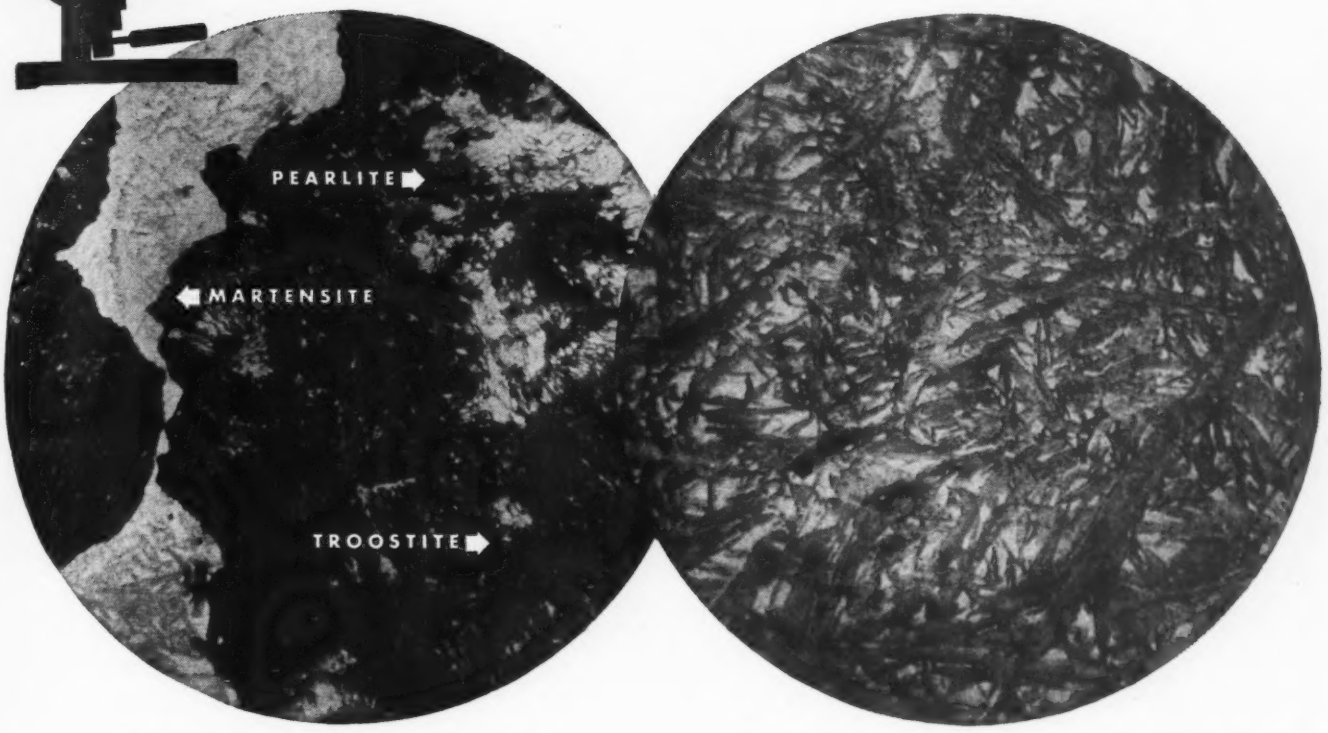
THE HILL ACME COMPANY

6400 BREAKWATER AVENUE • CLEVELAND 2, OHIO

"HILL" HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING • TAPPING MACHINES
"CANTON" ALLIGATOR SHEARS AND PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES AND SHEAR BLADES



Photomicrographs show the difference in Quenching Oils!



SAE 1090 steel quenched in conventional oil

SAE 1090 steel quenched in S/V Sova-Quench R

How S/V Sova-Quench R gives greater, deeper, more uniform hardness than conventional oil!

THE two photos above (magnified 1,000 times) tell their own dramatic story of the vast difference between quenching with a conventional oil and with S/V Sova-Quench R.

The picture on the left is that of a piece of SAE 1090 steel quenched from 1550°F., in a conventional oil. It shows a patch-work quilt of widely varying structure and therefore, varying hardness—Martensitic (large white areas), Troostitic (dark areas) and Pearlitic (small light areas). The conventional quench simply wasn't fast enough to get full Martensitic structure — maximum hardness — throughout.

The picture on the right is that of a piece of the same SAE 1090 steel, quenched from 1550°F., in S/V Sova-Quench R. Here, you see the deep, uniform hardness of 100 percent Martensitic structure.

★ ★ ★

The reason behind this vast difference is the fact that S/V Sova-Quench R creates an almost instant turbulence around the piece being quenched. This turbulence disperses the vapor blanket that ordinarily surrounds the piece, and brings the cooling oil into faster, closer contact with the hot metal.

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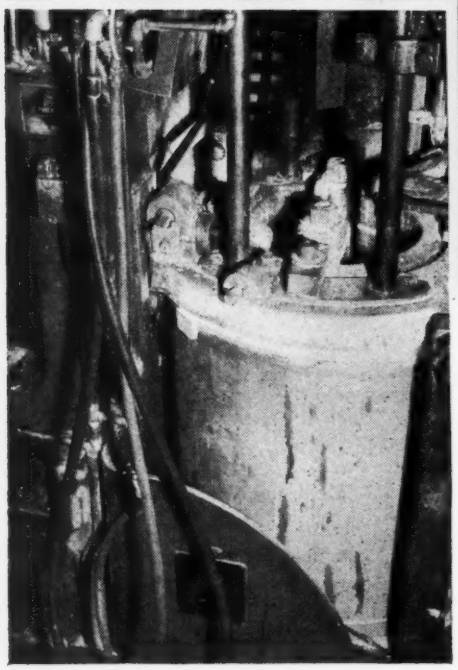
METAL is Saved and REJECTS are Fewer

When "N. C. R.'s" Die-Caster Pots Have Micromax Pyrometers



Big die-caster pot gets automatic Micromax temperature control, in National Cash Register Co.'s Dayton, Ohio plant. Photo shows pot partly dismantled for maintenance. Above, twelve Micromax Recorders and one Controller.

The problem of holding correct temperatures in die-caster pots is greatly simplified for National Cash Register Co. by the Micromax Pyrometers shown above. Some of the Pyrometers are Recorders, others are fully-automatic Controllers... the selection depending on the type of work being handled.

In either case, automatic instrumentation has proved a good investment. Regarding the Controllers, the superintendent says that "no man could hold the same even temperature, even if he stood by a caster pot and watched temperature all the time. Micromax helps save metal and fuel, by making the die casting more accurate and by reducing the number of rejects."

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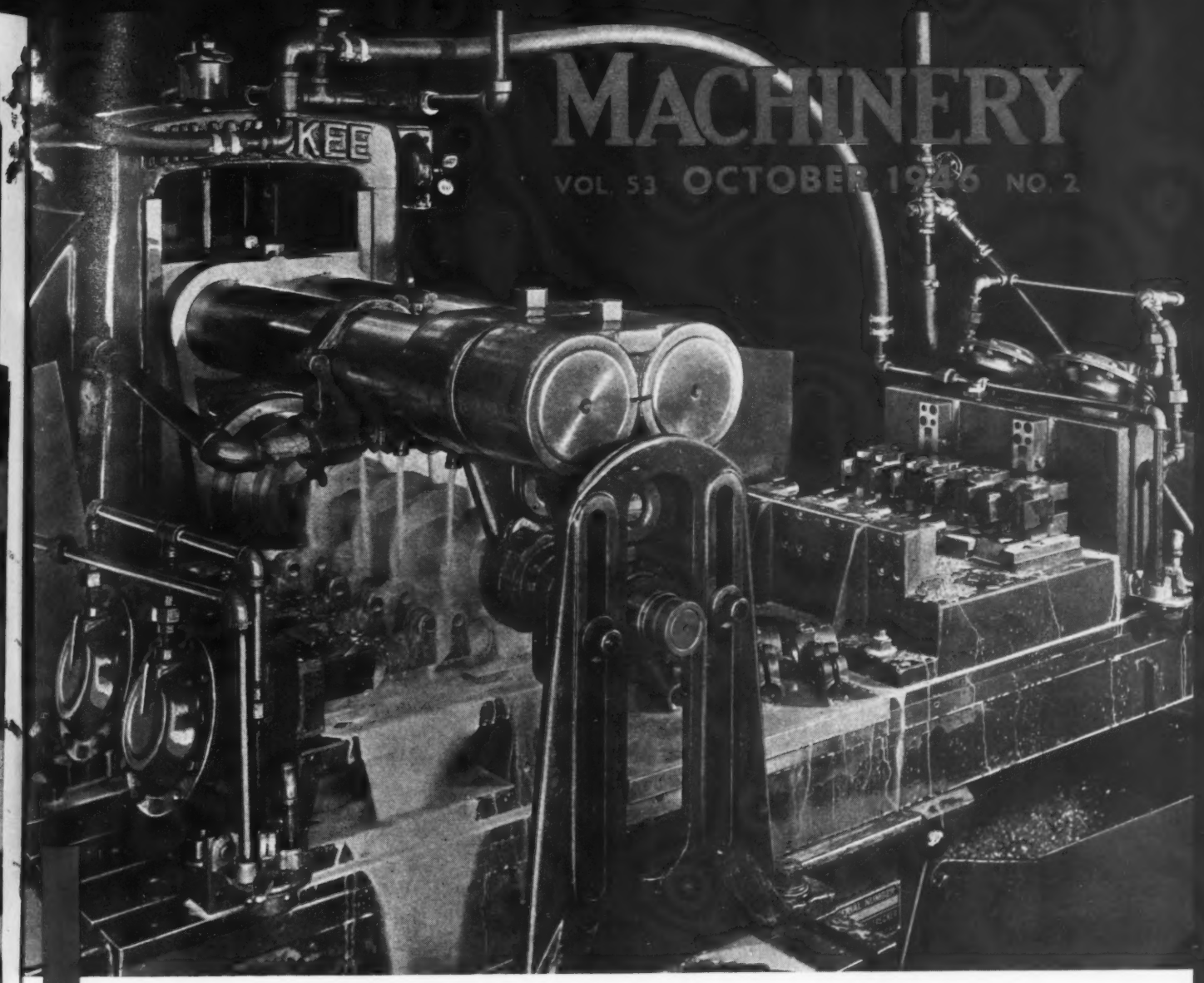


LABOR-SAVING BY THE USE OF PNEUMATIC WORK FIXTURES

By CHARLES H. WICK

In modern production, the actual machining time for a given operation is fairly stabilized. Therefore any method of reducing the time required for loading and unloading the work is of vital importance. Pneumatic operation of jigs, fixtures, chucks, and other work-holding devices is widely used, and has definite advantages for certain applications. The use of diaphragm type air chambers for such operations, however, is relatively new. Labor economy, increased production, safety, compactness, and reduced maintenance are the main advantages of this clamping method.

The basic parts required for operation and control of the fixtures here described are a diaphragm type air chamber, similar to the one shown in Fig. 1, and a two-way air control valve, shown in Fig. 2. These parts are manufactured by the Bendix-Westinghouse Automotive Air Brake Co.,

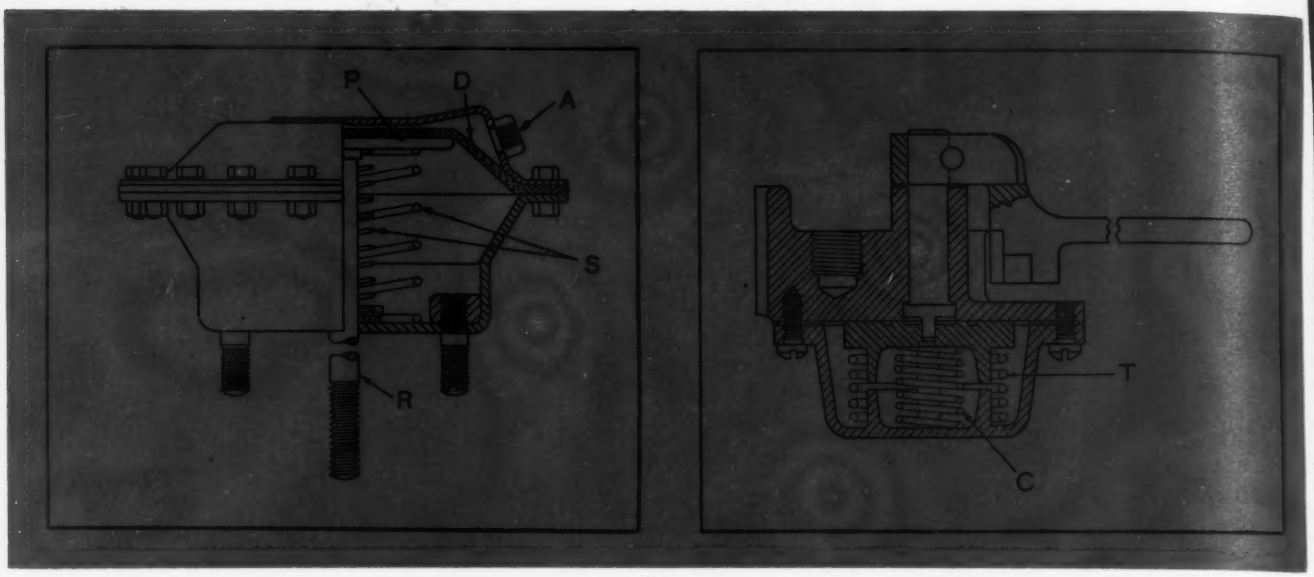


Fig. 1. Diaphragm Type of Air Chamber in which the Push-rod R is Advanced by Compressed Air Acting on the Diaphragm D, and Returned by the Action of the Two Coil Springs S

Fig. 2. Rotary, Disk Type, Two-way, Spring-return Air Valve that is Frequently Used with Air Chambers, Such as the One Shown in Fig. 1, for Industrial Air Controls

Elyria, Ohio, for use in the air-brake systems of trucks, buses, and other commercial motor vehicles.

The air chambers consist essentially of a heavy, corded rubber diaphragm *D*, which is clamped between two stamped steel cover plates. Compressed air enters and leaves the chamber through a connection *A* in the outside cover plate, and acts against the diaphragm, thus flexing it and advancing the steel push-rod plate *P*. Special chambers are available with a connection through the bottom cover plate for air-actuated return of the push-rod. However, in the type shown, which is the one most commonly used, the push-rod *R* is returned by the two coil springs *S* acting against the push-rod plate. This spring-return type of chamber is more economical to operate, since it consumes less air.

These air chambers are available in various sizes with effective diaphragm areas ranging from 9 to 36 square inches, and maximum strokes of from 1 3/4 to 3 inches. The lengths of stroke, which are relatively short compared to those obtainable with air cylinders, are practically the only limitation in the application of these chambers to industrial air controls. Any air pressure up to a maximum of 150 pounds per square inch can be used for operating these chambers.

The valve shown in Fig. 2 is a rotary, disk type, two-way, spring-return, air control valve. It contains three air connections—one for intake, another for connection to the chamber, and a third for exhaust. When the handle of this type valve is released, the torsion spring *T* returns it to the "off" position. Compression spring *C* keeps the disk in contact with the body and stem of the valve. Mechanical return valves, which remain stationary where set, are also employed for industrial air controls when required.

Foot control valves, automatic ejection of workpieces, and control of multiple functions with a single valve are some of the possible applications of these parts. By their use standard machines can be converted into automatic or semi-automatic units. The rate of feed or pressure can be easily regulated by controlling the air supply pressure.

The tubular wall and bolt lugs of forged-steel automotive steering-gear socket members are slotted while mounted in the two fixtures shown on opposite ends of the horizontal table of a Milwaukee milling machine in Fig. 3 and in the heading illustration. The slots enable the sockets to be compressed for clamping during assembly.

The fixture mounted at the left of the table supports four parts for conventional milling, while the fixture at the right supports four other parts for climb-cut milling. The four parts in one fixture are milled while the other fixture is being unloaded

and reloaded. In both fixtures, the diaphragm air chambers are connected by links and levers to the clamping members in such a way as to clamp the parts in the direction of the cut, so that the thrust is taken by positive stops, and not by the clamps. These solid stops effectively resist the thrust of the cutters without straining the moving parts of the fixture.

The two diaphragm air chambers mounted on the left-hand end of the fixture shown at the left are provided with push-rod extensions that operate the vertical levers seen at the right-hand end of the fixture. The upper end of each lever is pinned to a horizontal equalizer bar which, in turn, actuates two sliding clamp blocks. Each block slides in ways bolted to the base of the fixture. The two diaphragms thus supply the pressure necessary to clamp four parts against the solid stops at the left-hand end of the fixture. The pivoted equalizer bar compensates for differences in length of the two parts clamped by a single chamber.

The fixture at the right of the table is similar in that it also clamps four parts with two air chambers. However, since these parts are mounted in a reverse position, as compared with those in the fixture just described, and since the milling operation is a climb-cut, the solid stops are placed at the left and the clamping pressure is applied to the right ends of the parts. This is accomplished by connecting the push-rod of each air chamber to a bellcrank. The bellcranks, in turn, are connected to horizontal equalizer bars which move the sliding clamp blocks.

The two fixtures shown unmounted in Figs. 4 and 5 are for use on the same type of milling machine. The parts to be milled and the operations are similar, except that the slot is not so long. This permits the parts to be supported in a vertical position and fed horizontally to the cutters. One fixture supports six parts for conventional milling, and the other supports six parts for climb-cut milling. Three air chambers are used to clamp the six parts on each fixture.

In the fixture shown in the foreground of Fig. 4, and in the background of Fig. 5, which is used for the conventional milling operation, the parts rest on V-shaped clamping members which are provided with retractable locating plugs which enter the top of each part. The diaphragm type air chambers are mounted on the back of the fixture, with their axes vertical. The push-rods are connected to the V-shaped clamping members by rocker arms and equalizing levers. The surfaces of the clamps that contact the parts are inclined so that the parts are forced against the fixed, rectangular locating blocks which are seen to the right of each part in the illustration.

The fixture used on the opposite end of the milling machine table (Fig. 5) for the climb-cut milling operation, is identical except that the pressure is exerted upon the upper ends of the parts, forcing the parts down on the solid base of the fixture. The lower ends of the parts engage locating plugs which project up from the base of the fixture into the tubular ends of the socket members.

In all the milling fixtures described in the foregoing, which were designed by the Carpenter Engineering Co., Detroit, Mich., the pressure of the air

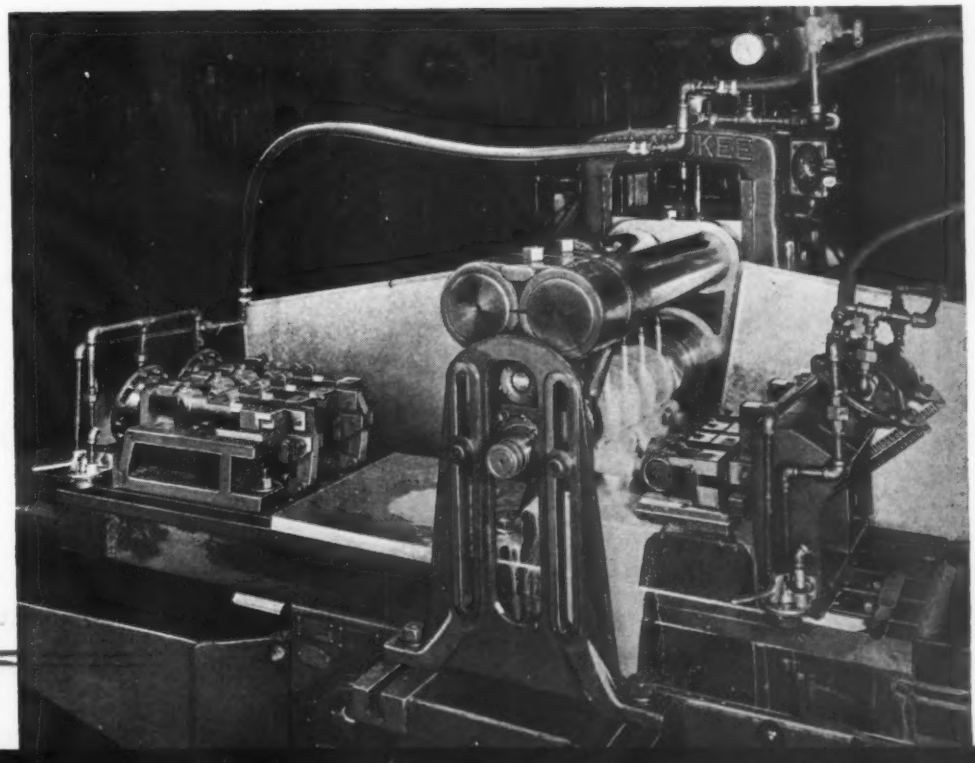


Fig. 3. The Two Air Chambers on the Fixture at the Left Clamp Four Parts while a Slot is Milled in Them in the Conventional Way. The Fixture at the Right is Designed to Clamp Similar Parts for Climb-cut Milling

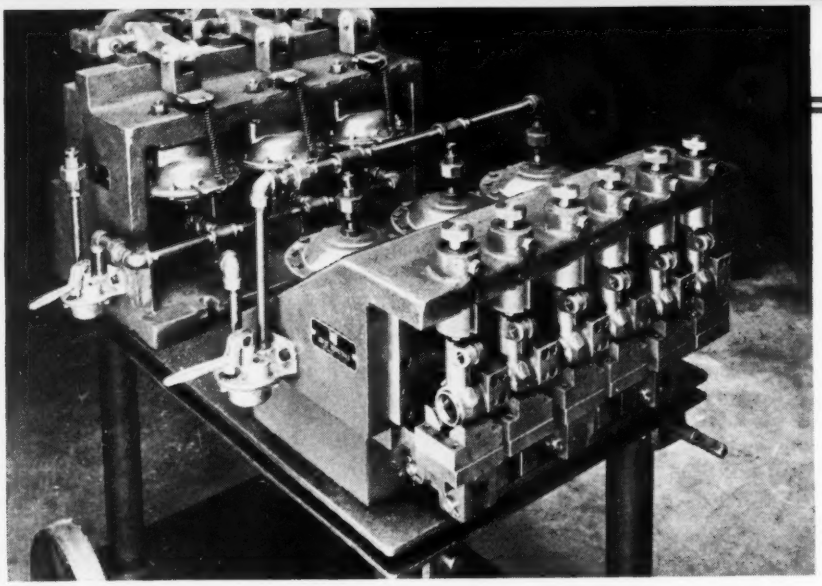


Fig. 4. A Pair of Air-operated Fixtures which are Mounted on Opposite Ends of a Horizontal Milling Machine Table. Each Fixture Clamps Six Parts while a Slot is being Milled in Them

chamber is exerted in the same direction as the thrust of the milling cutters. This allows the clamping mechanism to take up any "give" from vibration or thrust set up by the cutters. The multiple air chambers on each fixture are operated simultaneously by a single air valve mounted on the side of the fixture. The push-rods and diaphragms are returned to their original positions by springs when the air is turned off.

A typical fixture for straddle milling is shown in Fig. 6, mounted on the table of a Cincinnati duplex milling machine. This fixture is designed for milling both the top and bottom surfaces of cast-iron cylinder blocks of small air compressors. Since this is an initial machining operation, accurate location of the work is impossible, and the cylinder block is nested in the fixture on its rough cast surfaces.

The two carbide-tipped milling cutters used in this operation are rotated at 250 surface feet per minute. The milling machine table is fed horizontally between the cutters at the rate of 20 inches per minute, and 1/8 inch of stock is removed from each face of the block in one pass. The push-rod of each chamber has a stroke of approximately 3 inches. The chambers are connected to an air line having a pressure of 100 pounds per square inch, and exert a pressure of approximately 1700 pounds on each cylinder block. This pressure is sufficient to prevent chatter and slippage of the parts while they are being milled, reducing cutter breakage.

This particular operation, which requires only a quarter turn of the two-way valve for clamping, saves about 27 seconds per loading and unloading over the former hand-operated bar fixture that was actuated by turning two nuts with a large hand wrench.

Six diaphragm air chambers are incorporated in the unique fixture shown in Fig. 7. This fixture was also designed by the Carpenter Engineering Co., and is for use on a special four-spindle, lead-screw type tapping machine. The parts to be tapped are made from flat stock, rolled into a tubular shape with an open seam. They are clamped in the fixture with their axes vertical. The fixture has three work-holding stations—for loading, tapping, and unloading; and each station accommodates four parts. The clamping pressure exerted by the fixture successfully resists the torque created by the tapping of 11/16 inch–18 National

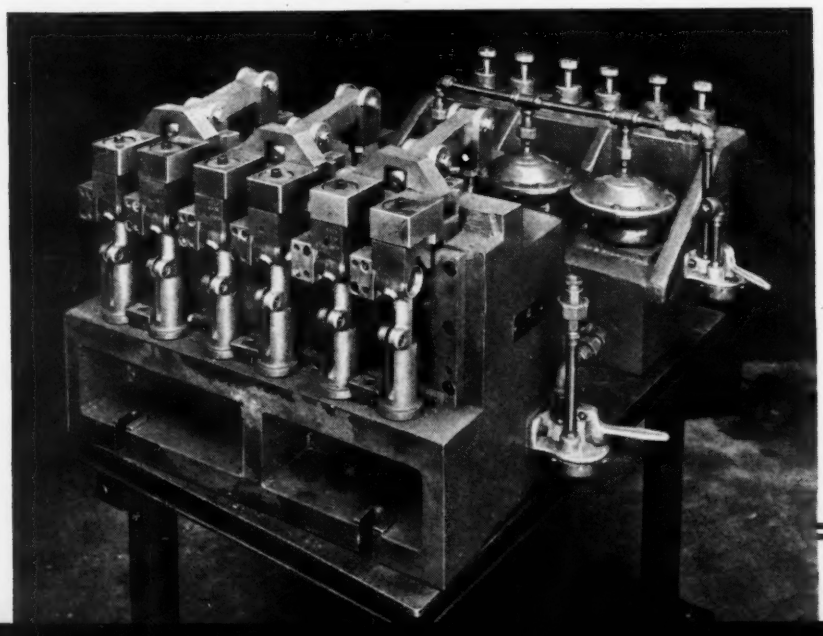


Fig. 5. Front View of Fixture Shown at the Rear in Fig. 4. The Three Diaphragm Type Air Chambers of Each Fixture are Operated by a Single Valve

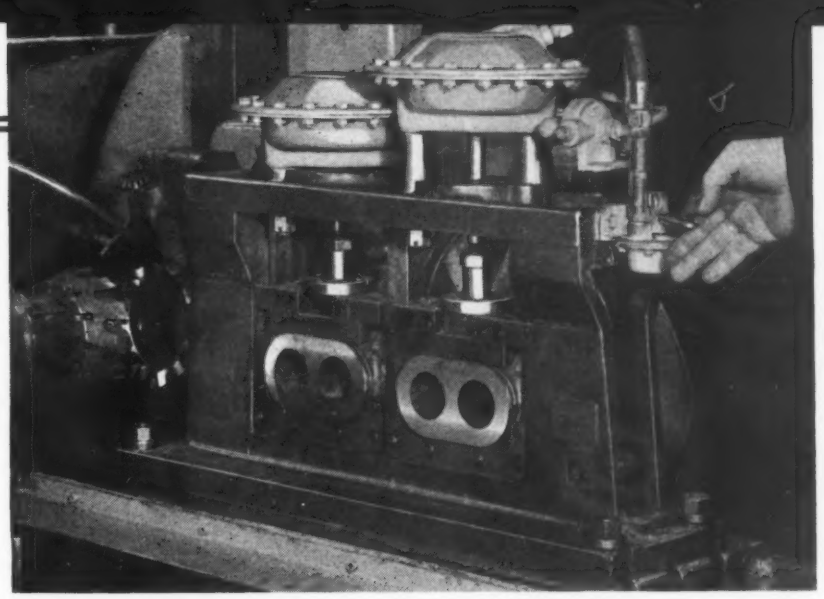


Fig. 6. Fixture Used for Holding Two Cast-iron, Air-compressor Cylinder Blocks while Straddle-milling the Top and Bottom Surfaces in One Pass between the Cutters

Fine threads to a depth of 2 1/2 inches in the parts.

The parts are clamped in pairs. Two parts are held against a stationary V-block by means of a clamping V-block which is moved approximately 1/16 inch by an individual air chamber which has a stroke of about 3/16 inch. The six chambers are compactly clustered about the center column, as shown in Fig. 8, around which the fixture is indexed. The chambers are actuated by cam-operated valves, which apply or release the air pressure on the diaphragm, depending upon whether the station is in the loading, unloading, or tapping position. The same cam, which may be seen at the unloading station to the right in Fig. 7, rocks a horizontal shaft to which four vertical fingers are keyed. Each finger lifts a part slightly, to free it from the surfaces of the V-blocks. The fingers then swing clear, allowing the parts to drop from the fixture and down a chute (not shown).

The air chambers used on this fixture have an effective diaphragm area of 6 square inches, and are operated with an air-line pressure of approximately 80 pounds per square inch. The yoke of each diaphragm push-rod is connected to one of the clamping V-blocks by a lever having a mechanical advantage of approximately 2.6 to 1. This provides a clamping pressure of approximately 1248 pounds, or 624 pounds per work-piece. The holding action of the V-blocks is increased by shallow grooves ground on their faces. The edges of these grooves

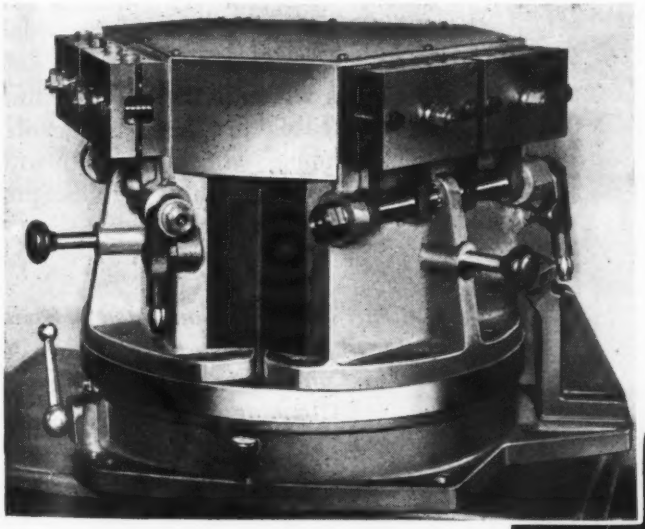
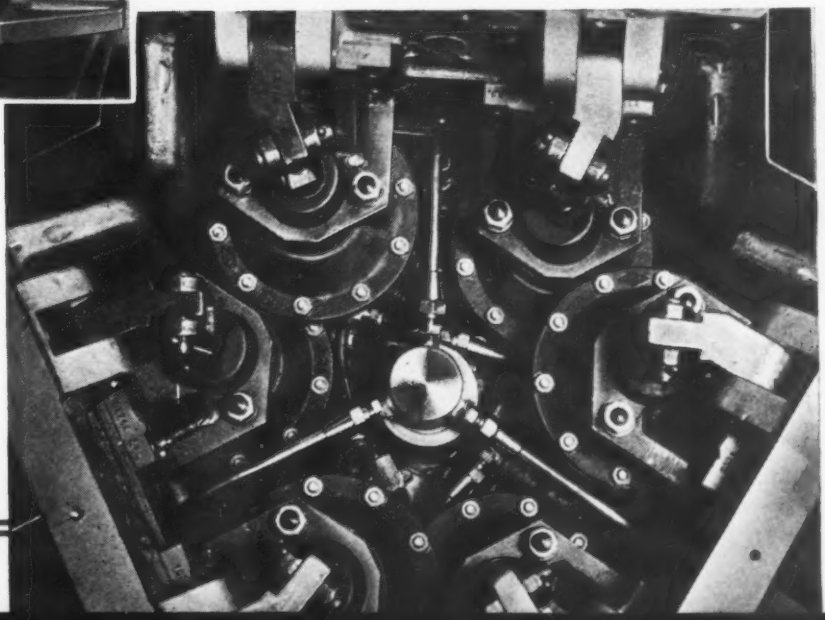
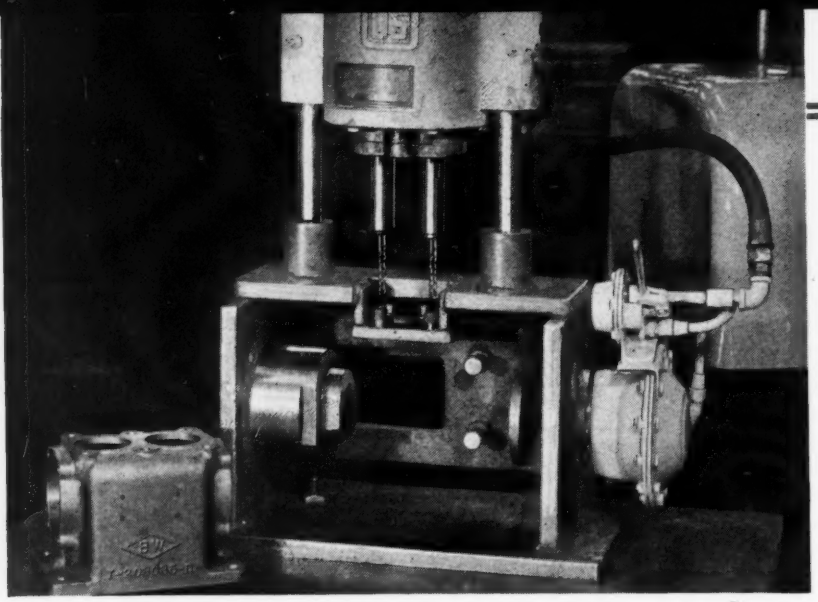
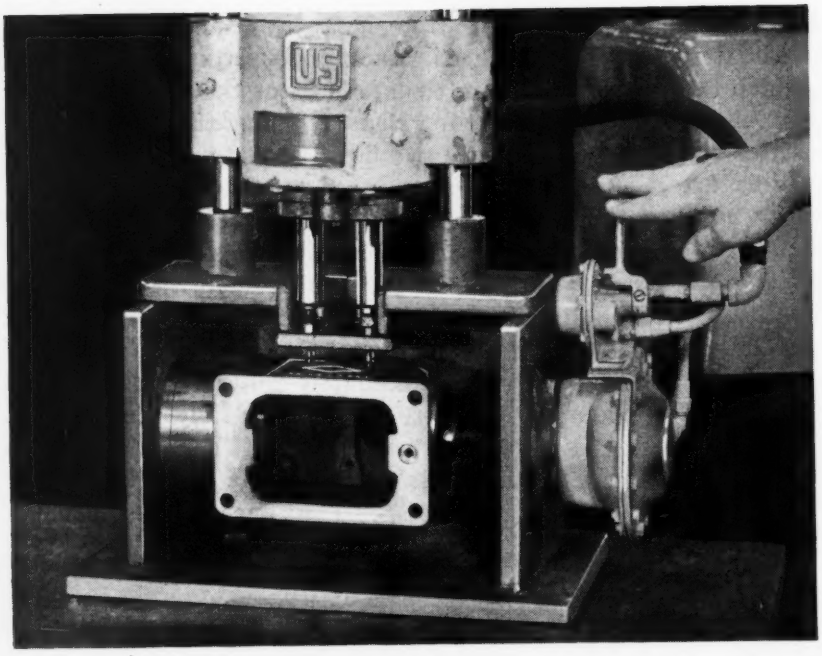


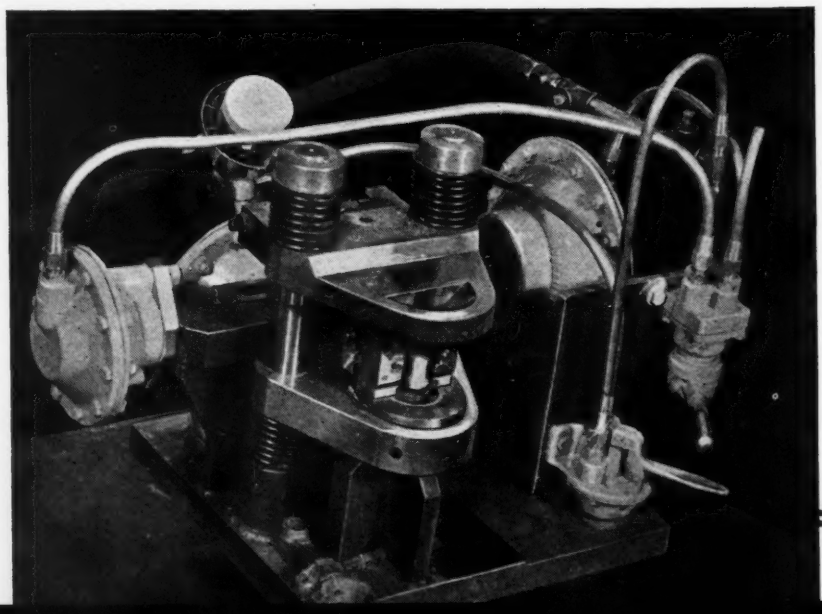
Fig. 7. (Above) Three-station Fixture which Clamps Four Parts while They are being Tapped. Four More Parts are Loaded and Another Four Parts Unloaded at the Same Time

Fig. 8. (Below) Top View of Fixture Shown in Fig. 7, with Cover Removed to Show Arrangement of Six Diaphragm Type Air Chambers. Two Parts are Clamped by Each Chamber when They are in the Tapping Position









engage the work-pieces and help to prevent their rotation.

The fixture shown in the unloaded and loaded positions, respectively, in Figs. 9 and 10 is used for holding a small compressor crankcase while drilling four small holes used for attaching the nameplate. These holes can be seen in the side of the crankcase at the lower left-hand corner of Fig. 9.

The interchangeable locating plug on the inner face of the left-hand wall of the fixture accurately fits in the bore of the crankcase to be drilled. The two posts on the back wall of the fixture serve to shift the cast surfaces of the crankcase into position for drilling. After such locating, the plate mounted on the push-rod of the air chamber at the right of the fixture is advanced to clamp the crankcase firmly in place.

An increase in production of 15 per cent has been obtained over that possible with the former fixture, which necessitated loading and clamping with a split washer and screws. Another advantage of this fixture is that all the various sizes of crankcases produced at Bendix-Westinghouse can be drilled with this one fixture simply by changing the locating plug.

Fig. 9. (Top) Air-operated Fixture Designed to Drill Four Holes in Small Compressor Crankcases for Attaching Nameplate

Fig. 10. (Center) Small Compressor Crankcase Mounted in the Fixture Shown in Fig. 9

Fig. 11. (Bottom) Connecting-rods and Caps are Clamped between the Jaws of This Babbitting Fixture by Means of Four Coil Springs. Two of the Air Chambers are Used for Opening the Jaws, and the Remaining Chamber for Ejecting the Parts

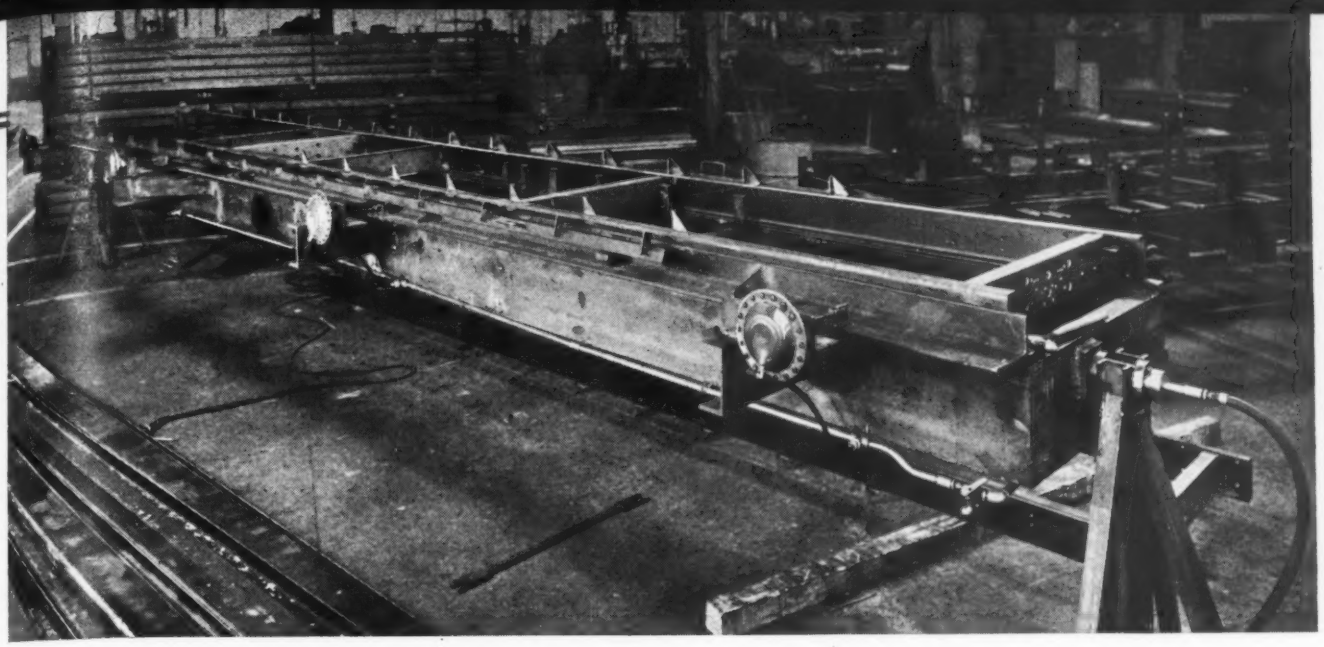


Fig. 12. Four Air Chambers are Employed on This Jig to Hold One of the Main Channels against the Cross Members of an Automotive Chassis during Assembly

The fixture shown in Fig. 11, which is used in babbitting repair connecting-rods and caps, replaces a hand-operated babbitt mold. The limiting valve shown at the top and in back of the fixture is used to regulate the pressure of the supply air. More pressure is required to babbitt the caps than the connecting-rods, and still more pressure to eject the caps and connecting-rods after babbitting. The coil springs shown at the top and bottom of the two fixture posts serve to close the jaws of the fixture and clamp the connecting-rod or cap while the babbitt is poured into the top of the fixture. Two of the three diaphragm type air chambers are used for opening the jaws against the pressure of the springs, and the remaining chamber is used for ejecting the part after babbitting has been completed. This fixture permits the babbitting of repair size rods without the use of shims, and reduces the amount of surplus babbitt to be removed from the parts.

Practically all the manually operated clamps on chassis assembly jigs at the plant of the Trailmobile Co., Cincinnati, Ohio, have been replaced with diaphragm type air chambers. The jig shown in Fig. 12 employs four air chambers to hold one of the main channels against the cross members of the chassis during assembly. The air chambers are mounted on angle-irons, which are welded to channels extending out from the base of the jig. The push-rods of the air chambers are connected to and move the long angle-iron which aligns the main chassis rail and clamps it against the cross mem-

Fig. 13. Universal Jig that Accommodates Various Size Chassis while Welding. Eleven Air Chambers are Used along Each of the Outer Bearing Surfaces, and Fourteen along Each of the Inner Bearing Surfaces

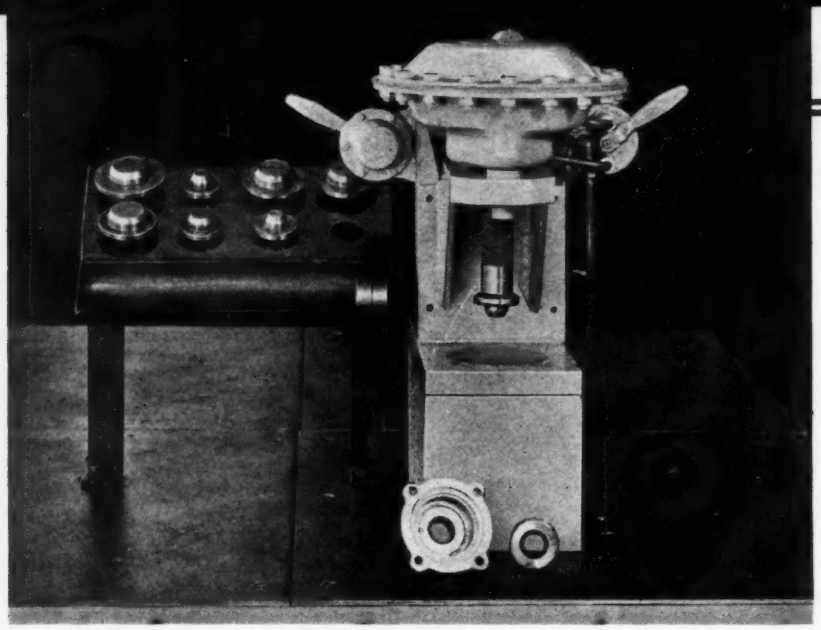


Fig. 14. Leather Seals are Pressed into Air-compressor Covers by the Use of the Air-operated Fixture Illustrated. Two Valves Must be Operated Simultaneously, thus Eliminating Danger to the Operator

bers. All four air chambers are actuated by a single control valve shown at the lower right-hand corner of the jig.

The universal jig shown in Fig. 13 will accommodate all chassis built by Trailmobile. Members of the chassis are welded together while clamped in this jig. There are eleven hold-down clamps, each actuated by a separate diaphragm type air chamber, along the bearing surfaces on each side of the jig. The two inner bearing surfaces each contain fourteen air chambers. An air control valve on the front of each bearing surface operates the air chambers along that surface. All the air chambers are operated from the shop air supply lines, which have a pressure of 90 pounds per square inch. This method of clamping represents a considerable saving in time over the former method, which employed screw type clamps that had to be individually tightened by hand.

Greater safety, economy, and a saving in floor space were obtained with the fixture shown in Fig. 14. The fixture is used to press rawhide leather seals into the end covers of air compressors. A cover and a seal are shown on the bench in front of the fixture. This operation was formerly performed on a floor type hydraulic arbor press which involved the use of the operator's hands to hold the cover during the pressing operation. The end cover is now nested in the base of the fixture shown, directly beneath the ram, and the seal is placed on it. The danger of injury to the operator has been eliminated by making it necessary to manipulate both valves simultaneously in operating the fixture, thus keeping his hands out of the danger zone.

Six small compressor cylinder heads are clamped in the fixture shown in Fig. 16 while installing 1/2-inch pipe-thread, core-hole plugs with a pneumatic hand-gun. The former method of clamping each head in a vise necessitated tightening and loosening the vise for each cylinder head, and required a considerable amount of handling of the air gun. The simple fixture shown increases production 100 per cent and greatly reduces operator fatigue.

A fixture for making pneumatic inspection tests on a treadle type air-brake valve assembly is shown in Figs. 15 and 17. Former testing methods neces-

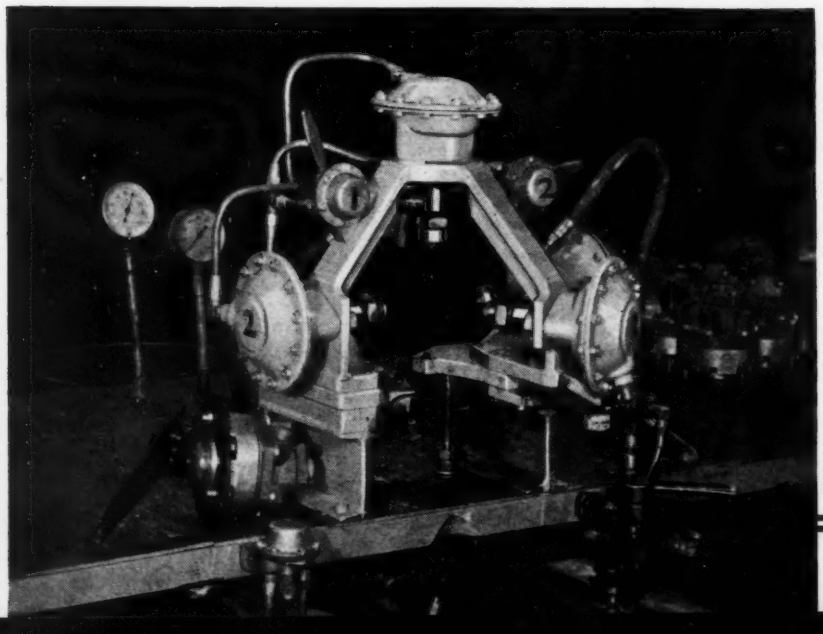


Fig. 15. Fixture with Four Air Chambers Used to Test Treadle Type Air-brake Valve Assemblies. Valve No. 1 is Used to Actuate the Chamber Located on Top of the Fixture. The Other Three Chambers are Operated by Valve No. 2

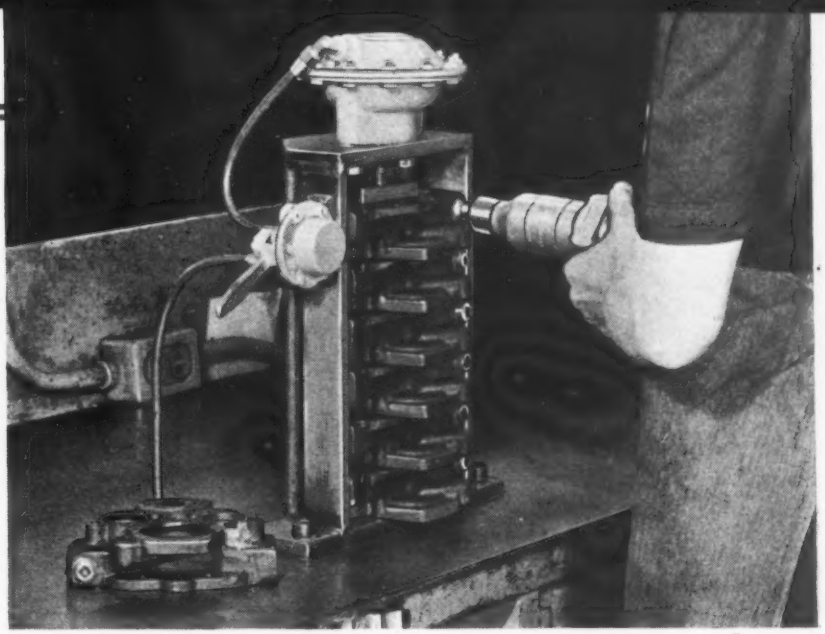


Fig. 16. Six Cylinder Heads are Clamped in This Air-operated Fixture while Plugs are Screwed into Them with a Pneumatic Gun. The Use of This Fixture Increased Production 100 Per Cent

sitated the manual threading of fittings to the four ports of the part being tested. A substantial saving in labor costs, an increase in production, and a reduction of operator fatigue have resulted from the use of this fixture.

Four diaphragm type air chambers are used in the fixture. The chamber located at the top of the fixture is operated by valve No. 1, and its push-rod advances a hollow plunger to seal the top part of the valve assembly being tested. Air for testing the valve is tapped into this plunger, thus passing into the valve assembly. The plungers attached to the push-rods of the front, left-, and right-hand chambers are simultaneously actuated by valve No. 2. The plunger attached to the front chamber is also hollow and tapped to permit air to enter the valve assembly. The right- and left-hand chamber plungers are solid, and simply seal the ports of the valve assembly which they cover.

The steady, uniform pressure exerted by the air chambers insures an air-tight seal, thus permitting an accurate test. One port, located at the back of the valve assembly, is left uncovered as an exhaust for the air used for testing. The two-way valve mounted on the front edge of the bench, to the left of the fixture, is used for controlling the air supplied to the fixture for the leakage tests. The valve that is fastened to the bench at the right of the fixture supplies air to a cylinder (not shown in the illustration) that actuates the foot-pedal of the valve assembly being tested, thus simulating actual operating conditions.

Immersion leakage tests of valve assemblies are greatly simplified, improved, and expedited by the use of air-chamber fixtures. In one such case, the air for testing is turned on and the part is clamped in the fixture simultaneously. The entire fixture, with the part to be tested in it, is then lowered into a tank containing soluble oil and water for the leakage test.

A swing type lock is often incorporated in these fixtures to prevent the part being tested from becoming loose and causing damage if the air supply pressure should be reduced. Such a safety lock can be released manually by the operator when the air valve is opened.

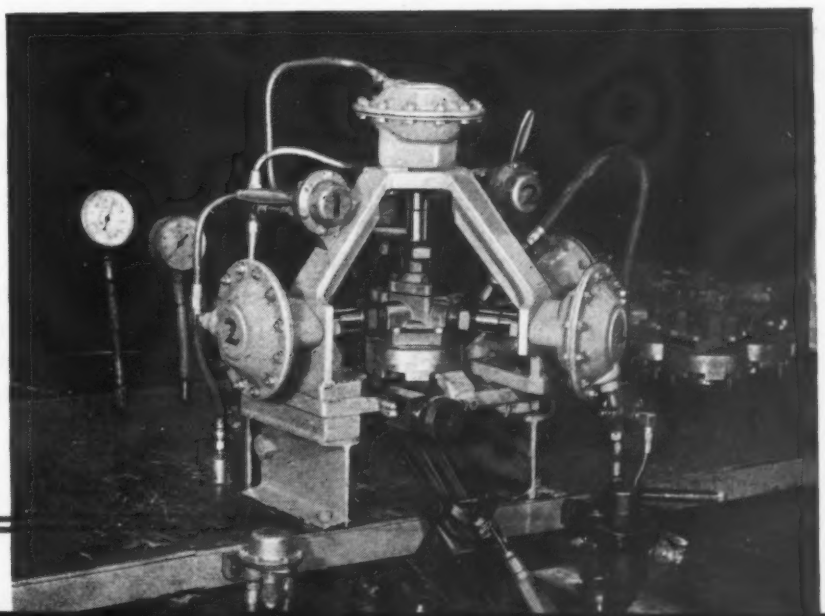
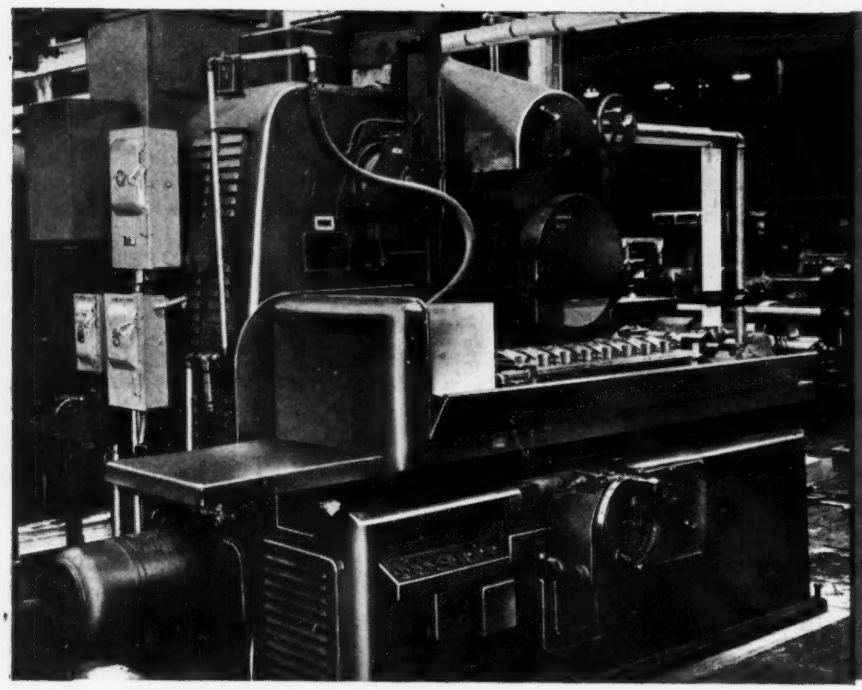


Fig. 17. Air-brake Valve Assembly Shown in Position for Testing. The Push-rods on the Right- and Left-hand Chambers Seal the Ports, while Hollow Push-rods on the Top and Front Chambers Carry Air into the Valve Assembly Being Tested

Grinding Dovetail Serrations



A Method of Grinding Developed During the War Period which can be Modified to Suit Many Applications in Peacetime Manufacture

By G. V. KELLER
Aircraft Gas Turbine Division
General Electric Co.

THE grinding of bucket serrations was one of the major problems to be solved in the manufacture of aircraft gas turbines during the war. Only a few buckets for experimental gas turbines had been made by grinding when production schedules were greatly increased. The experimental method was impractical for quantity production because it would have required an enormous amount of equipment and labor.

At the start of the program, the bucket material had not been definitely decided upon, but of the materials in use at that time, it was anticipated that a very hard and tough machining metal would be selected at first and later, a still harder material would be tried. Milling, broaching, grinding, and coining methods of making the serrations were investigated, and after intensive study and research, in cooperation with various machine tool manufacturers, it was decided that the crusher-roll grinding method would be the most accurate and practical for this job.

Experiments indicated that the bucket material was too hard to mill or broach satisfactorily. Neither the cutters nor the broaches would stand up; therefore, the required accuracy could not be maintained by these methods on the quantities required for production. Through close cooperation with well-know machine tool builders experienced in crusher-roll methods of grinding, the procedure for grinding the bucket serrations was perfected.

Surface grinders were used for all grinding operations, with the crusher-roll mounting fixture placed at one end of the grinder table. The mounting of this fixture is of extreme importance in obtaining accuracy in grinding the serrations. As the crusher roll reproduces the form in the grinding wheel, the mounting fixture must be of such a type that the crusher roll has a minimum of end play, is concentric with the mounting shaft, and can be raised or lowered in the same plane. The construction of the mounting fixture should be such that the operator can substitute a new roll for the worn crusher roll without making adjustments or taking measurements. The grinders are equipped with an automatic control which maintains a constant surface speed of the grinding wheel by compensating for grinding wheel wear.

There was a wide variation of opinion as to whether the crusher roll or the grinding wheel should be powered for the best results in crushing the wheel. After a series of experiments with both, it was decided that powered grinding wheels were more satisfactory. When the crusher was powered, the slippage between crusher and wheel due to the torque required to rotate the wheel caused flats to be ground on the roll, which reduced its useful life.

on Aircraft Turbine Buckets

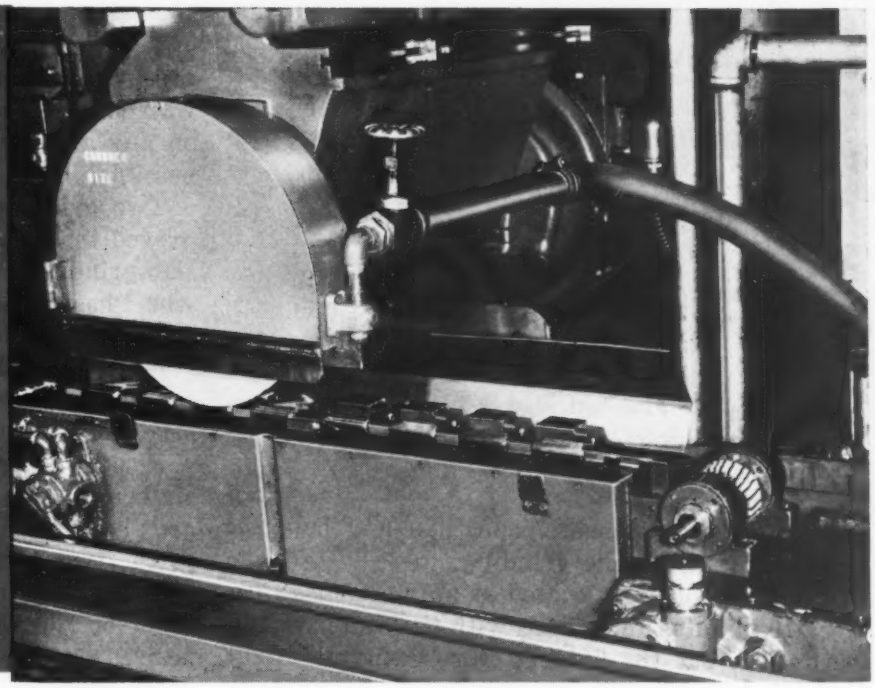


Fig. 1. Fixture Holding Eight Aircraft Turbine Buckets for Finish-grinding Serrations, and Crusher Roll Mounted on the Grinder Bed

The original crusher-roll fixture had the crusher-roll shaft mounted on ball bearings, which required a great deal of maintenance; and accuracy could not be obtained when crushing the wheel, due to end play. A new design of crusher-roll holding fixture was made which replaced the ball bearings with roller bearings, and included facilities for adjusting the amount of end play. These new fixtures operated very satisfactorily, and accurately crushed the form in the grinding wheels. The heading illustration and Fig. 1 show the crusher roll and fixture mounted on the grinder bed.

The Bucket Serration Grinding Fixture

Experimental units had been built with a fixture that held only one bucket. The bucket was positioned in the fixture by the contour of the bucket blade, but owing to the inaccuracy of the positioning, the bucket could not be removed from the fixture between rough- and finish-grinding. This made it necessary to rough- and finish-grind the serrations with the same wheel. This was a very slow process, and it was necessary to crush the wheel so often to maintain the correct form that a crusher roll would last only for eight buckets. Experiments on the fixture which held only one bucket proved that the crusher-roll life could be greatly increased by rough-grinding the buckets on one machine and finish-grinding on another.

The designing and the manufacturing of production fixtures was turned over to a machine tool manufacturer. To permit accurate positioning of the bucket on different grinding fixtures, and to hold the bucket firmly while grinding, the brazing of a 1/2-inch square boss on both angular ends of the bucket base was suggested. (See Fig. 3.) A center was machined in each boss. It was accurately located from the contour of the bucket blade and the inside edge of the serrated base. Fig. 4 shows the bucket in the fixture used for locating and machining the centers in the bosses; Fig. 5 shows the fixture with the top half swung back.

The heading illustration shows a production grinding fixture that holds eight buckets—the maximum number that could be accommodated in the length of the grinder table. The fixture has a sliding center between each two buckets to locate and hold them. When the fixture is loaded, the valve of a pneumatic piston is opened to admit air under pressure to the piston. Pressure is transmitted through levers to tighten the centers against each end of the buckets. Another pneumatic piston operates through a set of cams to clamp the end of the bucket blade against a stop. These two clamp-

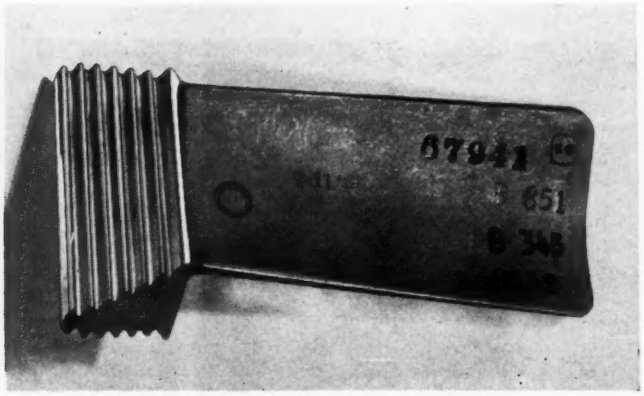


Fig. 2. Finished Aircraft Gas Turbine Bucket with Serrations Ground

ing mechanisms accurately position and hold the buckets in place while grinding.

The serrations are located at an angle of 18 degrees 19 minutes 18 seconds with the center line of the bucket, but the fixtures were designed to tilt the buckets so that the grinding wheel would have to be dressed at a 4-degree angle instead of at the angle of the serrations. This was done in order to keep the grinding surfaces of the wheel as nearly the same diameter as possible and thus reduce the possibility of slippage between the grinding wheel and the buckets.

The Grinding Operations

The sequence of the grinding operations was given careful study, and much experimental work was done. Since all buckets can be interchanged on any grinder or fixture, rapid stock removal is possible.

Two grinding operations are used, this having proved to be most economical. The first is rough slab-grinding. For this operation, the grinding wheel has the shape of the base of the bucket, but without serrations. The second operation is finish-grinding. In this case, the grinding wheel has the contour of the base of the buckets, including the serrations.

For the rough slab-grinding of the bucket base, sixteen buckets, eight in each of two parallel rows, are placed in the fixture shown in Fig. 6. Only one of the two parallel rows is shown in the illustration. The grinding wheel is sufficiently wide to cover both rows of buckets, and is crushed to the desired contour by the double crusher-roll mounted in the fixture on the end of the grinder table.

The bases of all sixteen buckets are then ground on one side. Next, each bucket is turned over and placed in the opposite side of the fixture, and the second side is ground. Stock amounting to 0.015 inch over the finished dimension is left on each side of the bucket base. The grinders operate at twenty

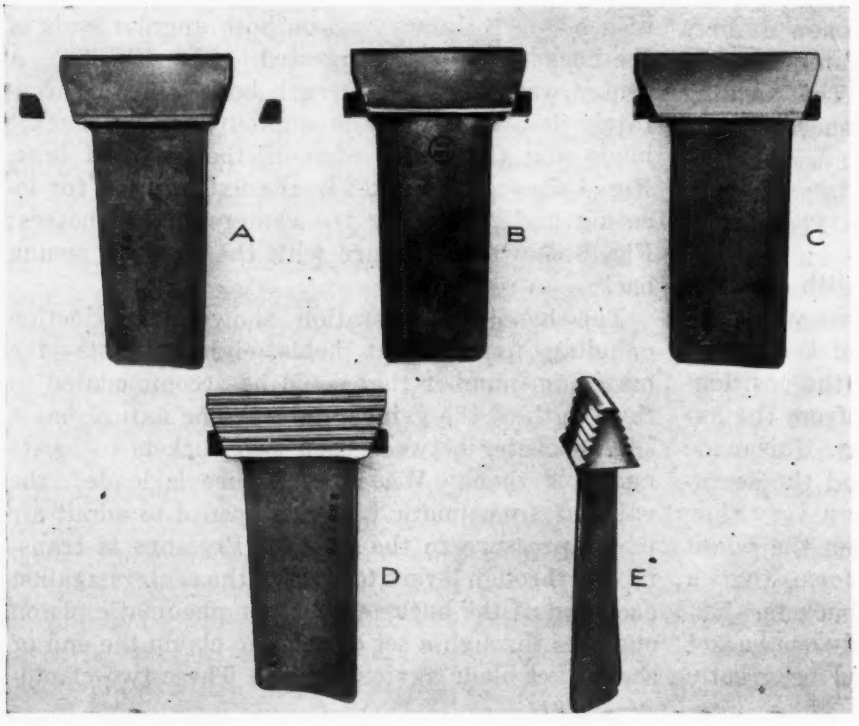


Fig. 3. (A) Bucket and Bosses; (B) Bucket with the Bosses Brazed on; (C) Bucket with the Base Rough- or Slab-ground; (D) Bucket with Serrations Finish-ground; (E) Bucket after Finish-grinding, with Bosses Removed

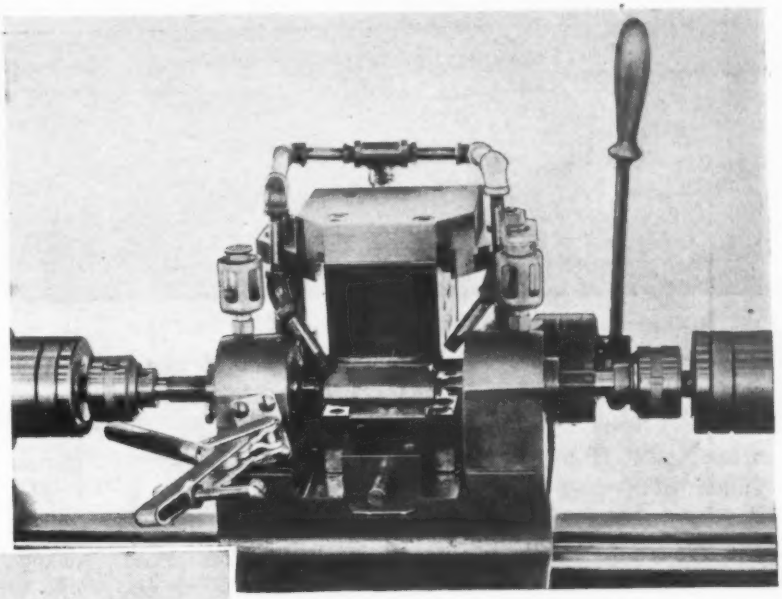


Fig. 4. (Right) Machine and Fixture for Locating and Machining Centers in Bosses

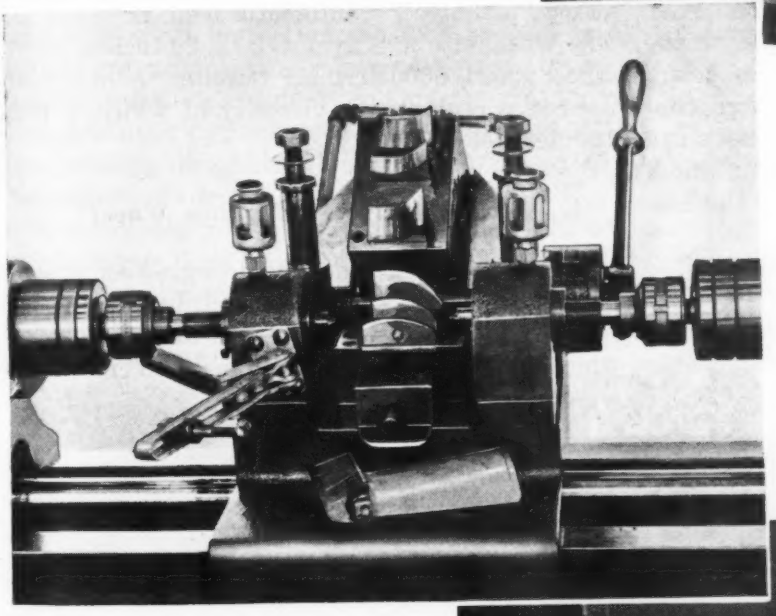


Fig. 5. (Left) Fixture Shown in Fig. 4 with Top Half of the Fixture Swung Back

Fig. 6. (Right) Fixture Holding Sixteen Buckets, in Two Parallel Rows of Eight Each, for Rough-grinding, and Double Crusher Roll Mounted on Grinder Bed. Only One Row of Buckets is Visible

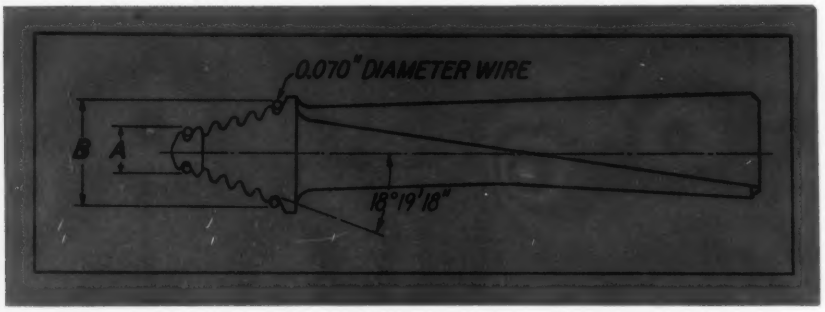


Fig. 7. Diagrammatic View of Bucket. The Tolerance over 0.070-inch Diameter Wires at A and B is Plus or Minus 0.0015 Inch

strokes per minute. The down feed per stroke is 0.0006 inch (automatic feed). The grinding coolant is heavy oil, viscosity 193 at 100 degrees F.; the wheel size, 8 by 3 by 20 inches; and the wheel speed, 6000 feet per minute.

For finish-grinding, eight buckets are placed in the fixture shown in the heading illustration. Four buckets are placed with the concave side of the blade up, and four with the concave side down. The grinding wheel is crushed to the desired contour, which includes serrations. The serrations are ground on one side of all eight buckets, after which the buckets are placed in the fixture with the second side up, and ground.

Referring to Fig. 7, the tolerance over the wires at *A* and *B* is plus or minus 0.0015 inch. This tolerance is measured over wires 0.070 inch in diameter. Actually, this is a closer tolerance than it appears, because a variation of 0.001 inch in the width of the serration would cause a change of 0.004 inch in the dimension at *A* or *B*, as measured over the wires.

The grinding machine operates at a speed of twenty strokes per minute. The down feed per stroke, actuated by automatic feed, is 0.0006 inch. The wheel size is 8 by 1 1/2 by 20 inches, and the wheel speed, 6000 feet per minute. A heavy oil is used as a coolant, the viscosity of which is 193 at 100 degrees F.

Crushing the Grinding Wheel

Before crushing a new grinding wheel, it should be soaked several hours in the oil used for coolant. After this, the crusher roll is set directly under the wheel, and the automatic feed is set to crush 0.0001

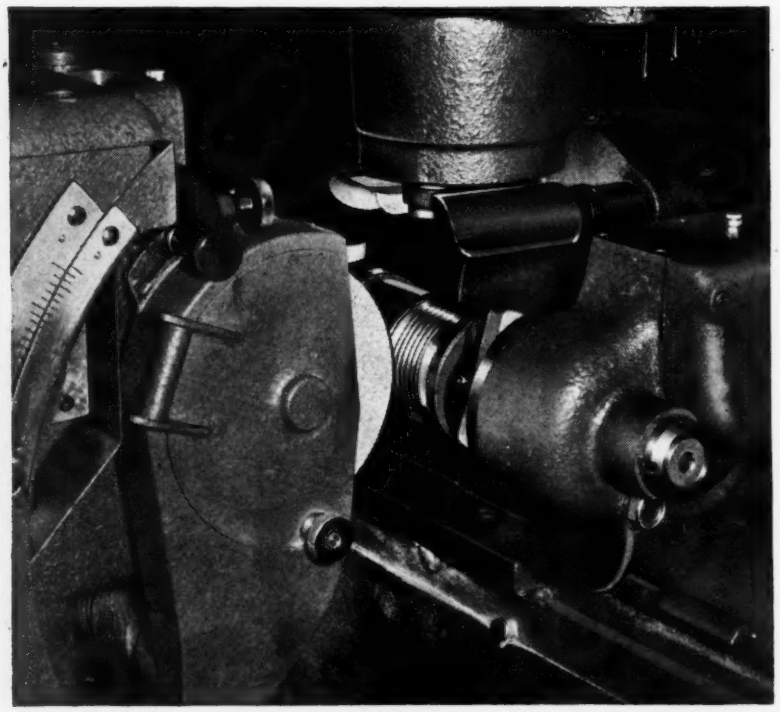


Fig. 8. Grinding Master Crusher Roll on a Micro-Form Grinder

inch for each revolution of the grinding wheel, which rotates at approximately 40 R.P.M. After the grinding wheel once has the form crushed in it, subsequent crushing of the wheel requires only approximately 0.0025 inch crushing depth. The coolant is used while crushing the wheel. The slow speed of the grinding wheel is obtained by applying low voltage to the motor that drives the wheel.

The Crusher Rolls

The accuracy attained in grinding the serrations can be no greater than that of the crusher roll. Every precaution must be exercised in manufacturing the crusher roll to obtain the right contour, pitch, concentricity, and location of serrations, diameter of bore, and squareness of faces with the bore. A rigid inspection must be applied to the finished crusher rolls. Two different types of crusher rolls are required; the master crusher roll, which is used to produce the working crusher, and the working crusher, which is used for grinding the serrations in the buckets.

The crusher rolls can be reworked many times after losing their contour, as they are originally made to the maximum diameters. It is possible to reduce the working crusher roll approximately 1/2 inch in diameter during its useful life.

Many experiments were required to determine the best crusher-roll material. At first, high-speed steel crusher rolls were used, but a large number of these cracked during hardening and were scrapped. It was found that a Kinite steel crusher roll is cheaper to make and has longer life than one made from high-speed steel. Crusher rolls are made from both bar stock and castings.

The Kinite stock is turned, leaving sufficient material for finish-grinding. A Micro-Form grinder is used to grind the contour of the master crusher rolls, as shown in Fig. 8. The contour of the roll is reproduced from a master fifty times the size of the roll to be ground on a pantograph. The operator views the form-grinding through a 35-power microscope. Both the longitudinal and the in-and-out table travels have ten-thousandths inch indicators, used with precision gage-blocks. An accuracy of from 0.0002 to 0.0003 inch is obtained.

The production crusher rolls are made on a thread grinder (Fig. 9). A master crusher roll is mounted on an arbor and fed into the wheel by means of a hand lead-screw. After the master crusher-roll form has been reproduced in the grinding wheel, the grinding wheel is used to plunge-cut the production crusher. About ten production crusher rolls can be made from one master roll.

The life of crusher rolls made from Kinite steel

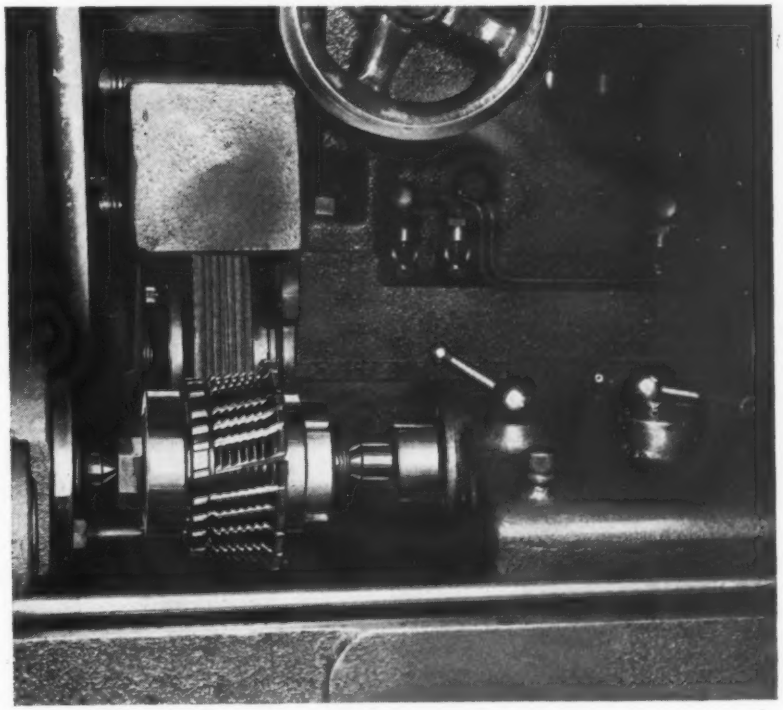


Fig. 9. Grinding Production Crusher Rolls on a Thread Grinder

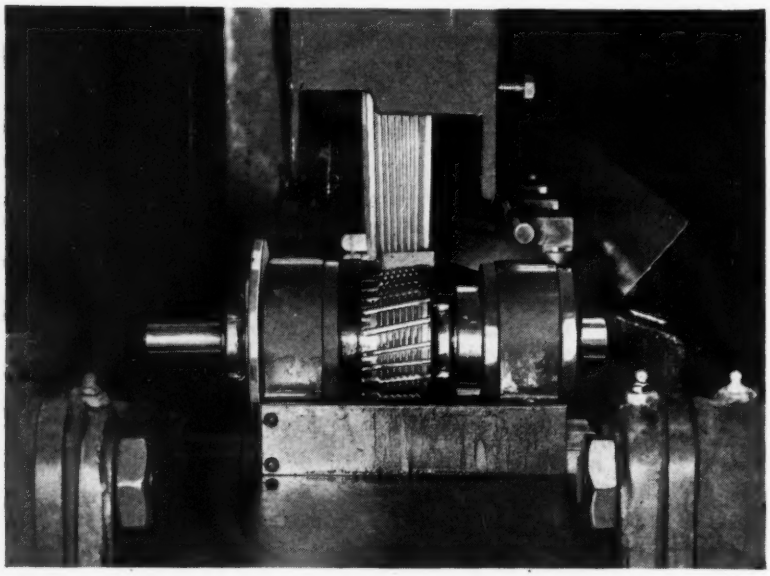
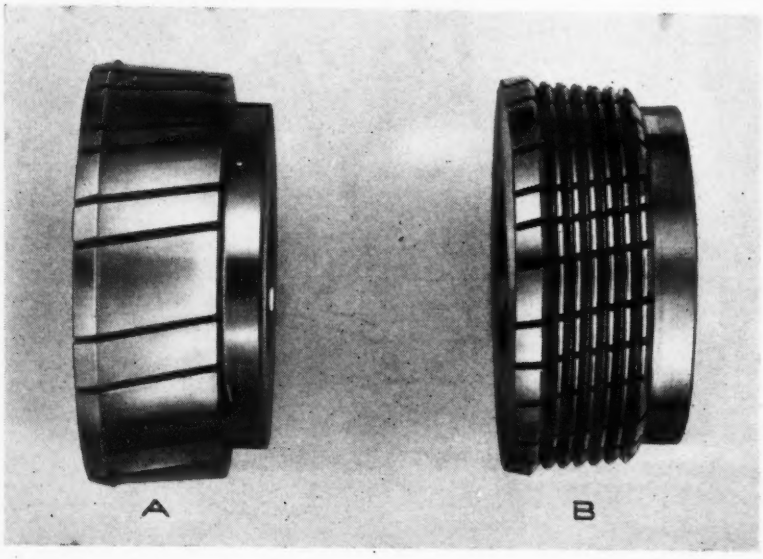


Fig. 10. Crusher Roll Mounted in Machine and Grinding Wheel Crushed, Ready to Grind Serrations in Buckets

Fig. 11. (A) Crusher Roll Used to Crush Wheel for Rough-grinding; (B) Crusher Roll Used to Crush Wheel for Finish-grinding



has been thoroughly studied. It should be noted that the skill of the operator is a large factor in the life of crusher rolls. At first, when a fixture was used holding one bucket at an angle of 18 degrees 19 minutes 18 seconds for rough- and finish-grinding the serrations, the crusher-roll life was equivalent only to from three to eight buckets. This fixture, which was experimental in character, was discarded after about 200 buckets had been ground.

Then, when the fixture holding eight buckets at an angle of 4 degrees for finish-grinding the serrations was used, the crusher-roll life rose to from forty to sixty buckets between grinds, and the total roll life was 600 buckets.

Each grinder was equipped with a 5-H.P. cooling unit and an industrial filter. The following shows the improvement in crusher-roll life by filtering and refrigerating the coolant to 80 degrees F., instead of letting the coolant temperature rise to the usual 160 degrees F. without refrigeration:

1. The number of buckets finish-ground on the serrations was increased from 50 to 200 without reworking the crusher roll. The total life of the crusher was increased from 600 to 2400 buckets.

2. On a fixture holding eight buckets, the number of buckets rough slab-ground was increased from 200 to 700 without reworking the crusher roll. The total life of the crusher was increased from 2400 to 7000 buckets.

3. The fixture holding sixteen buckets and the double crusher roll for rough slab-grinding operations gave the following results: The number of buckets ground without reworking the crusher rolls was 2500 and the total life of the crusher was approximately 25,000 buckets. It should again be emphasized that the skill of the operator is an important factor in increasing the crusher life.

The contour and pitch of the serrations are checked by projecting them on a comparator. The image is magnified twenty times, and projected against a master outline on engineers' glass.

Surplus Machine Tools and National Security

ARMY and Navy officials have been deploring in no uncertain terms the too rapid redeployment of our fighting personnel. Little has been said, however, about the haste with which the various armed services have planned to divest themselves of thousands of the machine tools which made it possible for our Army and Navy to win the war—the machines that were necessary for turning out the guns, ammunition, ships, and airplanes which overpowered our enemies—machines that were built under the most trying conditions during the early days of the war.

If present plans are carried out, many special machines that may some day be required for the production of ordnance will be going to the junk heap within the next six months. For example, it is planned to scrap a large number of shell-turning lathes—machines that were one of the most serious bottlenecks at the beginning of the war because lathes of that type were not available in private industry. If we don't watch out, we may find ourselves, in case of another war, as poorly prepared as we were for the last!

This is a matter that should be of serious concern to our Government, but Congress so far has failed to appropriate even enough money to oil or grease expensive machinery that is awaiting disposition. The plans for the disposal of present idle machine tools in our Government-owned wartime plants were developed by civilians and officers in our armed services—men who know all about the difficulties encountered at the beginning of the war. Perhaps their exuberance over victory warped their judgment in assigning to surplus lists machines that are no longer required for war winning purposes, at least for the present.

But there have been changes in authority in the ordnance departments of our armed services. There are now important officers in those departments who feel keenly the responsibility of being always prepared for possible war, but they are powerless to do anything about it under present policy. One of these officers recently went on record as being in favor of maintaining a substantial number of fully equipped standby plants, instead of relatively few, and of carefully checking all equipment in these plants at least once every five years. Obsolete types of machines should, in this officer's opinion, be replaced after these periodic inspections, so that modern standby plants will be ready to operate efficiently whenever international difficulties arise. An adequate supply of standard machine tools is just as imperative as special types.

Such a program of industrial preparedness would cost money, but it would constitute cheap insurance for national safety. In the event of another war in this atomic age, there may not be time to prepare industrially.

President Truman recently asked Donald Nelson to make a survey of our standby plants. Let us hope that this survey will lead to the establishment of an adequate number of such plants, and will not merely result in the set-up of an efficient administration system for the plants that have already been set aside.

Charles O. Herb

A New Method of Protecting

A RADICALLY new method of protecting machinery or other objects for shipment or storage—a method by which outdoor storage is feasible with the assurance of complete protection—has been developed by the R. M. Hollingshead Corporation, Camden, N. J. The method consists of spraying a covering around—not on—the object to be protected. This spray method is a simple and quick means of protecting parts, assemblies, or complete machines, regardless of size or shape.

Briefly, it consists of an initial spraying operation which bridges large openings and empty spaces with long web-like filaments that completely enclose the part being packaged. Subsequently, spray applications of a new plastic, consisting of modified film-forming vinyl resins carried in volatile solvents, produce a durable, tough, flexible, moisture-impervious covering that withstands exposure to wind, rain, snow, and sunlight over long periods. This new plastic is known as "Cocoon."

The machine as prepared for enclosure in a Cocoon is not treated with any rust-preventive compound; it is merely lubricated with the regular operating lubricants normally used in the machine. In other words, the machine is in the condition in which it would be installed in a factory.

In order to eliminate the possibility of piercing the finished Cocoon, all sharp projections on the machine are first padded by wads or other suitable padding, as indicated in Fig. 1. Then ordinary tape, like Scotch tape, is applied in strips, connecting the outer projections of the machine, vertically as shown in Fig. 1, and sometimes horizontally, resulting in a tape grid with the tapes approximately 20 inches apart. As the tape carries no load after the Cocoon covering has been sprayed on, it need be of no special type. This taping process gives the "package" an even contour and reduces to a minimum the amount of material required for the covering.

The object of the tape is to provide adhesion

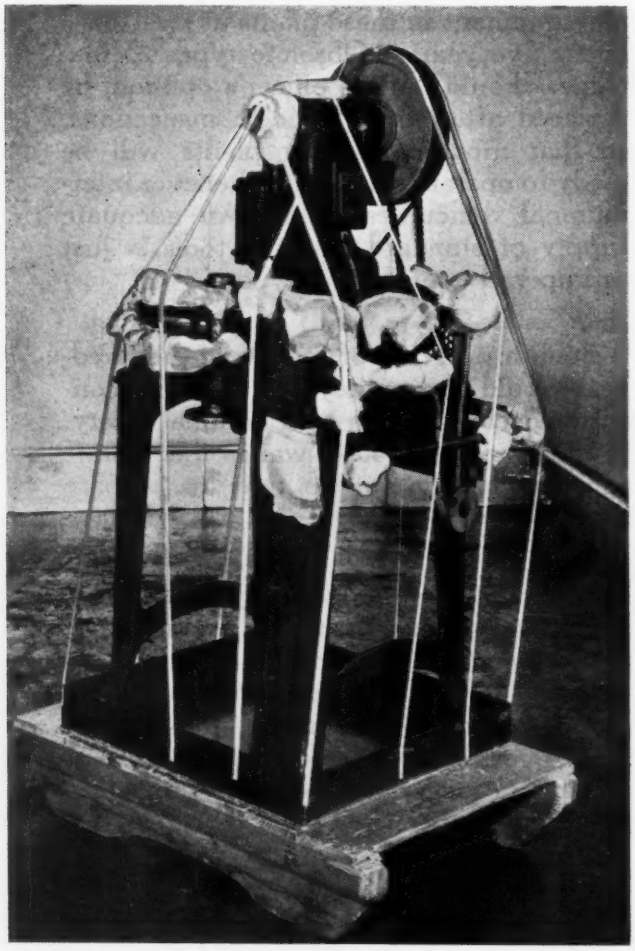


Fig. 1. A Machine to be Covered by Protective Cocoon, Taped for the Cobweb Spray, which is the First Step in the Process

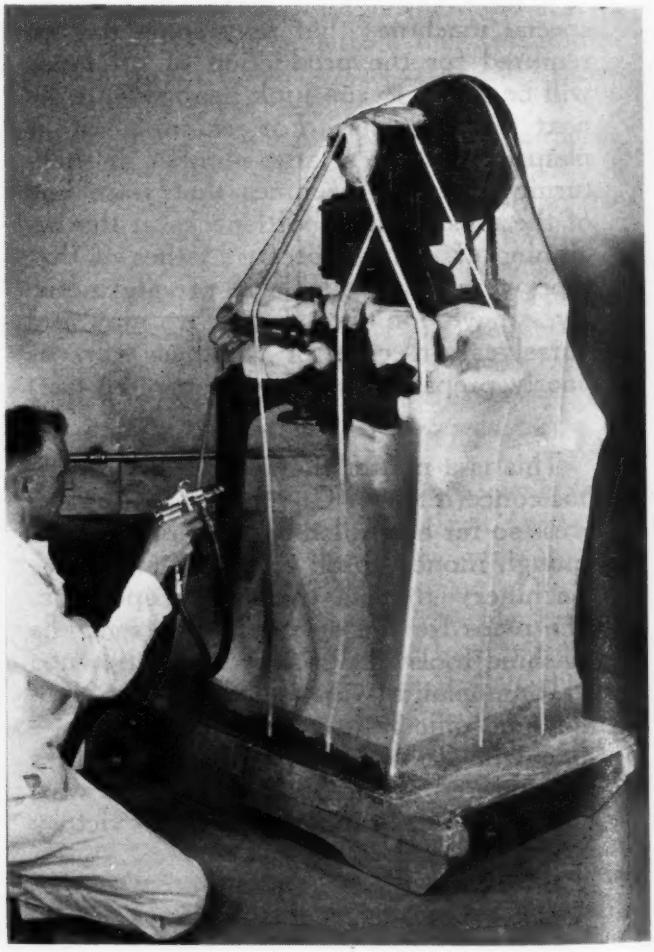


Fig. 2. Cobweb Spray being Applied. The Spray Filaments Bridge over the Gaps between the Tapes, but do Not Cover Machine

Machines for Shipment or Storage

points for the cobweb-like filaments that are sprayed on from a standard spray gun. These filaments bridge over the gaps in the tape grid, as indicated in Fig. 2. The spraying of the cobweb-like filaments is continued until a thin translucent film is built up around the machine. This film need only be strong enough to withstand the spraying of successive coats of plastics without rupturing. It is normally referred to as the webbing coat.

Next, the webbing coat is reinforced and made into an effective moisture barrier by the application of spray coats which consist of Cocoon solution without any webbing agent. The first of these coats is usually colored yellow by the addition of a dye, in order to provide a means of gaging the thickness of the coat. The spraying of this coat is continued until the coating shows an even yellow color. At this point also the solvent vapors trapped inside the now completely formed (but not completed) Cocoon, are released by cutting two holes in the Cocoon and blowing out the vapors with a fan or blower. Any holes cut in the Cocoon can obviously be quickly and conveniently sealed by merely applying the spray coating.

Now the second spray coat is applied, as indicated in Fig. 3, this coat being colored by the addition of a red dye. By using different colors for the two coats, it is possible to know when the complete second coating has been applied, the spraying being continued until the yellow coat has been completely covered and the package shows an even red color.

A suitable moisture-absorbing material, usually silica gel, is next placed inside the Cocoon and the holes cut in the Cocoon cover are patched. This is done by spraying around the edge of the hole, placing a patch of the Cocoon material over the hole, and spraying around the edge of the patch. If desired, a transparent Vinylite window can be substituted for a Cocoon patch over one of the holes. This allows periodic inspection of the interior of the package during storage. The Vinylite window is attached by a method identical to that

Fig. 3. Applying One of the Spray Coats that Form the Strong, Resistant, Moisture-proof Covering. Three Coats are Generally Used

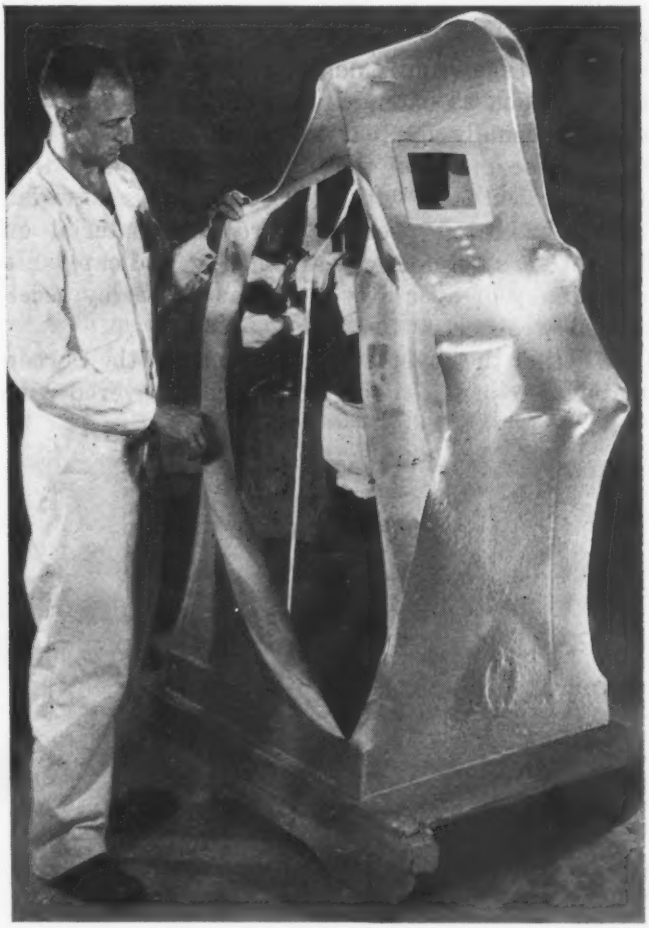


Fig. 4. Removing Covering by Simply Slitting it Open with a Knife and Peeling it off. Note That Cocoon does Not Adhere to Metal Surfaces

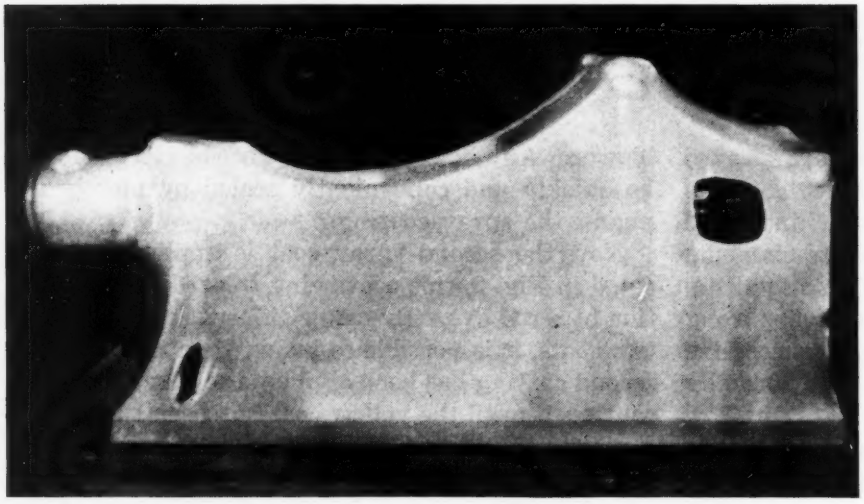


Fig. 5. A Machine that has been Encased in a Cocoon for Shipment to China

employed when patching with the Cocoon material. After the addition of an aluminum top coating, also applied by spraying, as indicated in Fig. 3, the Cocoon package is ready for shipping or storage in any location where the moisture-resistant characteristics are required for less than a year. Additional protection, if necessary, can be obtained by adding another top coat before putting on the aluminum.

For storage requirements involving extreme conditions, such as extended outdoor storage, the top coating usually applied is "Insul-Mastic," a Gilsonite-base material that is sprayed on and that forms a good bond with the Cocoon. This material, which has been used as a roofing material on freight cars for many years, has an indicated life expectancy of over fifty years, as shown by accelerated weathering tests.

Whether the covering consists only of the Cocoon material or of one made from Cocoon covered with "Insul-Mastic," a final coating of aluminum is recommended. This furnishes protection against the actinic rays of the sun and increases the wearing qualities of the covering.

Fig. 4 shows how the Cocoon covering can be removed from a machine. A long vertical slit is made in the material with a sharp knife, and then the Cocoon is peeled from the machine in less than a minute. It should be emphasized that there is no adhesion of the Cocoon covering to the machine.

The following advantages are claimed for coverings of this kind: (1) No special equipment is required; a spray gun and a supply of air are the only things necessary besides the coating material. (2) Equipment of all sizes and shapes, from a ball bearing to a locomotive, can be protected. No predesigned form or fabrication is required. (3) No time is lost in applying greasy, rust-preventing compounds or in cleaning them from the equipment when it is to be put back into use. The Cocoon covering is peeled from the equipment very quickly. (4) Since there is no limitation on the size or shape of the package, it is not necessary to dismantle bulky equipment, covered for storage. (In Fig. 6 is shown one of 1400 airplanes of the B-29 type which are encased in Cocoon for long-term outdoor storage. Only the engines have been removed and are separately protected.) (5) Compared with many other processes, such as export-packing procedures, metal containers, etc., the method is relatively inexpensive. (6) It provides protection not only against rust and deterioration by corrosion, but also against mildew and mold.

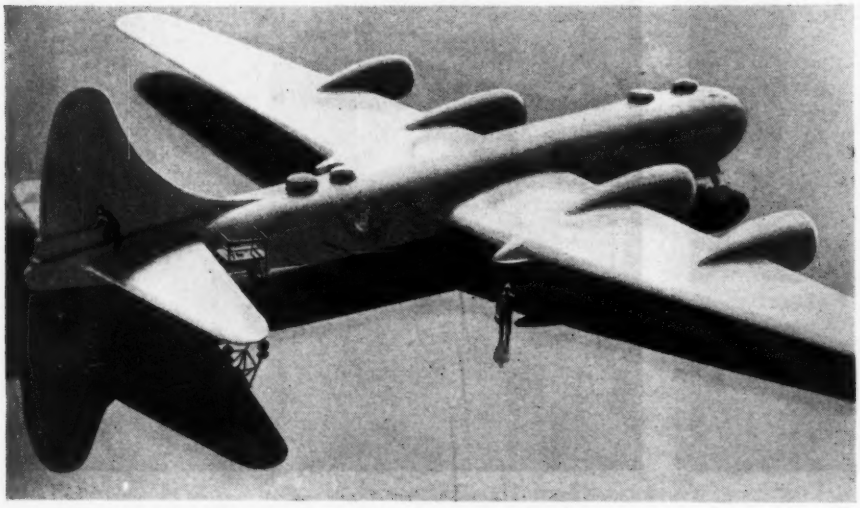


Fig. 6. A B-29 Airplane—One of 1400 being Covered for Protection against the Weather Conditions Encountered in Outdoor Storage

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Gearing Industry Reports Increasing Demand

The gearing industry, as represented by the members of the American Gear Manufacturers Association, reports great activity. There was an increase of 26.8 per cent in the volume of sales of gearing in July this year, as compared with June. This report does not include turbine or propulsion gearing, but covers specifically industrial gear requirements.

Eugene O'Brien, New President of the A. S. M. E.

EUGENE WILLIAM O'BRIEN, editor-in-chief and managing director of *Southern Power and Industry*, and vice-president and director of the W. R. C. Smith Publishing Co., Atlanta, Ga., has been elected president of the American Society of Mechanical Engineers for the year 1947.

Mr. O'Brien was born at West Warwick, R. I., in 1897, and received his early education in the public schools of his home town. Later he entered Brown University in Providence, from which he graduated in 1919 with the degree of B.S. in electrical engineering. Two years later the degree of Sc.M. in mechanical engineering was conferred upon him by the same university, and in 1925, the degree of M.E. by Yale University.

From 1918 to 1922 he was a member of the engineering faculty of Brown University, and later held a similar position at the Sheffield Scientific School of Yale University. During this period he also spent much of his time in consulting engineering work, serving part time in a number of consulting offices in New England and undertaking independent commissions in the fields of mechanical, electrical, and power design and construction. From 1925 to 1927 he served as mechanical and electrical engineer for Jenks & Ballou, engineers of Providence, where he was in charge of design, construction, and plant management projects.

In 1927, he became editor-in-chief of the *Southern Power Journal*, and in 1933, he was appointed managing director of that publication, now known as *Southern Power and Industry*. He has been vice-president and director of the W. R. C. Smith Publishing Co. since 1936. He is also chairman of the Fulton County (Atlanta, Ga.) Planning and Zoning Commission, a director of the American Society of Planning Officials, a charter member of the Georgia Engineering Society, and a member of the Society of American Military Engineers. He has been a frequent contributor to the technical and business press.

He became a member of the American Society of Mechanical Engineers in 1921, and served on that Society's Council as manager from 1931 to 1934, and as vice-president from 1934 to 1936. He has served on many committees of the Society. He is also a member of the American Institute of Electrical Engineers, and chairman of that society's National Committee on Student Branches, as well as a member of the Newcomen Society of England and of the Society for the Promotion of Engineering Education. During the recent war he served as engineering consultant to the War Production Board and the War Manpower Commission.

A. S. M. E. to Publish Metal-Cutting Data Sheets

DURING the war, the American Society of Mechanical Engineers, through its Manufacturing Engineering Committee working in conjunction with the Office of Production Research and Development of the War Production Board, published a series of metal-cutting data sheets as an aid to the war effort. About 10,000 sets of these sheets were distributed free of charge throughout industry. They were devoted primarily to milling data obtained as a result of Government-sponsored research at the California Institute of Technology and the University of Michigan.

The American Society of Mechanical Engineers has now entered upon the regular monthly publication of a similar series of data sheets, making available to industry timely information about cutting tools and methods, particularly new information on the use of carbide-tipped tools, based on research laboratory reports and industrial experience. As an A.S.M.E. publication, these data sheets will have a broader scope. They will not be distributed free, but will be sent only to regular subscribers. For further information, address A.S.M.E. Publication Sales Dept., 29 W. 39th St., New York City.

Engineering News

Accurate Steel Balls Half the Size of a Pinhead Being Produced

Production for immediate industrial use of high-precision steel balls 1 millimeter (0.0394 inch) in diameter has been started by the S K F Industries, Inc., Philadelphia, Pa. These balls were originally designed for a new type of fountain pen, but they will also be available for delicate instrument bearings and other applications. During their manufacture, inspection, and gaging, the balls are not touched by human hands.

The balls are so tiny that 7000 of them weigh only an ounce. They are priced to sell at about 2 cents apiece, which means that an ounce would be worth about $140, or four times the value of an ounce of gold, which is only $35. These balls are made to extremely fine tolerances. The 1-millimeter ball is within five-millionths inch of being perfectly round. The diameter variations are fifty-millionths inch or less.

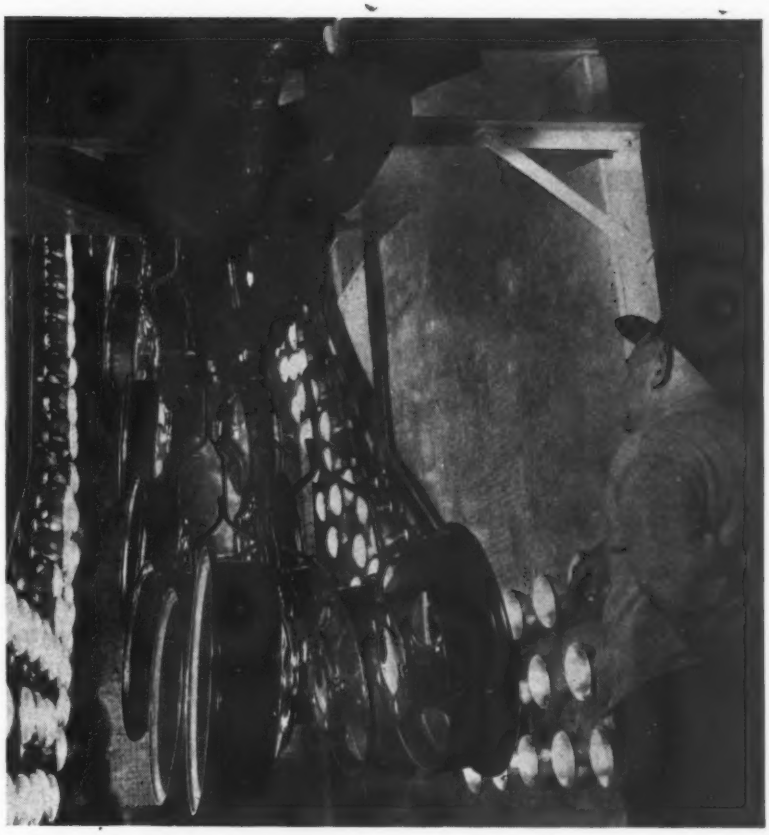
A special process imparts a satin-like finish to the balls, so as to provide greater surface cohesion for inks and lubricants. The finish consists of minute scratches, which are invisible unless highly magnified. The material used is high-carbon, chromium steel wire, 0.045 inch in diameter. This wire is fed into machines that cold-press the ball blanks at the rate of 18,000 an hour. After heat-treating and tempering, the balls are ground to correct size. Nine separate operations and 190 machine-hours are required in the manufacture of a batch of 500,000 balls.

The inspection for surface defects is performed by the use of binoculars and an automatic machine which rotates the balls in the field of magnification. A needle-sized magnet is used to remove defective balls from the inspection machine. The sizing is done in machines having tapered blades inclined toward each other, mounted under a glass shield which eliminates dust and drafts. The balls roll to a point between the tapered blades where the width between the blades permits them to drop. Thus they fall into separate compartments according to size, each compartment receiving balls of equal size. These balls are shipped in lots of 1000 each. They are weighed on apothecary scales, and are packed in oil in plastic bottles.

Locomotive Boilers Are Now Being Welded

The American Locomotive Co. has announced that welded locomotive boilers are now being built at its shops in Schenectady, N. Y. This important development is the result of nine years of experimental operation of a welded boiler built by the American Locomotive Co. in 1937 for a freight locomotive

During Metal-spinning Operations, the Metal often Becomes Work-hardened. To Anneal the Work without Loss of Production Time, Engineers at the East Pittsburgh Works of the Westinghouse Electric Corporation have Set up a Gas Torch near the Work. The Flame is Controlled by Means of a Foot-pedal on the Floor. Only a Small Pilot Light Burns until the Operator Pushes the Pedal. Thus Burning of the Work is Prevented



Through the Use of Infra-red Lights for Preliminary Heating, the Paint-drying Process on Truck Wheels has been Reduced from One Hour to Twenty Minutes at the Studebaker Automobile Plant, and Improved Finished Surfaces Result. A Battery of the Lamps is Placed on the Sides of the Wheel Conveyor as it Begins its Ascent to the Second-floor Paint-drying Ovens. The Installation is so Compact that Spray Booths and Ovens can be Located at the Point on the Assembly Line where the Wheels are Fitted to the Chassis

on the Delaware and Hudson Railroad. For nine years, tests on this experimental installation have been conducted under the supervision of the Interstate Commerce Commission. The boiler has been completely free from leaks during this period, and all the welded seams are in perfect condition.

X-rays are used for detecting flaws in the weld metal. After passing X-ray examination, the boiler is stress-relieved in a huge furnace, large enough to take an entire boiler. The smooth contour of the welded boiler permits an easier application of the boiler lagging and jacket, and provides an equally smooth surface on the interior. The saving of weight in the welded design is also important. Depending upon the type and size of locomotive, this weight saving may be anywhere from 3000 to 6000 pounds for a single boiler, with additional savings in the weight of lagging and jacket. It is believed that a considerable number of welded boilers will be in use on American railroads in the next few years.

Complete "Package Electric Sub-Stations" Developed by General Electric Co.

"Package sub-stations," incorporating as a completely coordinated ready-to-assemble unit all of the hundreds of parts previously obtainable on a piece-by-piece basis for installation by the customer, have been developed by the General Electric Co., Schenectady, N. Y. These package sub-stations are available in any one of hundreds of arrangements in ratings up to 45,000 K.V.A., and include standard transforming, regulating, relaying, metering, and protective equipment. A high degree of flexibility to allow for future load changes is provided in many of the arrangements.

In the past, factory-assembled unit sub-stations have usually included only the transforming, regulating, and switching equipment beyond the high-voltage entrance to the transformer. As one General Electric engineer expressed it, "Now we supply everything except the real estate and the 'Warning' signs." It is expected that this departure will reduce engineering and drafting requirements on the part of the customer and simplify purchasing. It will facilitate the planning and the choice of system and sub-station to give the best quality of service at the lowest possible cost.

Test Equipment Measures Effectiveness of Crankcase Ventilation System

The effectiveness of crankcase ventilation systems can now be accurately measured at all speeds and under all operating conditions of the engine by means of portable test equipment developed by engineers of the Ford Motor Co. Previous test methods offered no accurate means of measuring exactly how much air was being circulated at the various engine speeds.

The new test equipment makes use of two direct-reading, air-flow measuring tubes, one showing the flow of air into the engine and the other the flow of gases out of the engine. Small blowers are used to compensate for line drop. "Blow-by," which is the flow of gases forced from the combustion chamber past the piston-rings and into the crankcase, can also be determined with this equipment. The equipment can be installed on the engine to be tested within a few minutes.

Work-Holding Methods Used in

Pieces of the Type Shown are Particularly Difficult to Hold for Grinding. This Method Solved the Problem

Examples of Methods and Devices Used in Connection with the Grinding of Flat Surfaces on Surface Grinding Machines. Fifth of a Series of Articles on Modern Surface Grinding

ALTHOUGH fixtures for flat surface grinding must support the work rigidly, the clamping may be much lighter than for most other methods of machining. As the pressure of the wheel on the work is downward and sidewise, there is no tendency for the work to be lifted from the table as, for example, in climb-cut milling. Slipping of the work on the chuck is easily prevented by blocking. As a result, flat surface grinding permits the use of fixtures which are simple, inexpensive, and usually quick-acting, both in loading and unloading.

If a piece can be brought to the wheel, a way can be devised to hold it. For example, one shop had to grind a most complicated shape, 6 by 12 by 12 inches. A fairly complicated fixture would have been required if the part were to have been ground in even fairly large lots; but only one piece came through at a time, and that infrequently. The shop worked out an effective method to hold this part with no fixture whatever. Cast-iron chips were heaped on the magnetic chuck and the work was tamped down firmly in the pile, taking care that the surface to be ground was level. The magnetized chips held the part securely, and the job was done with complete satisfaction as regards accuracy, speed, and cost.

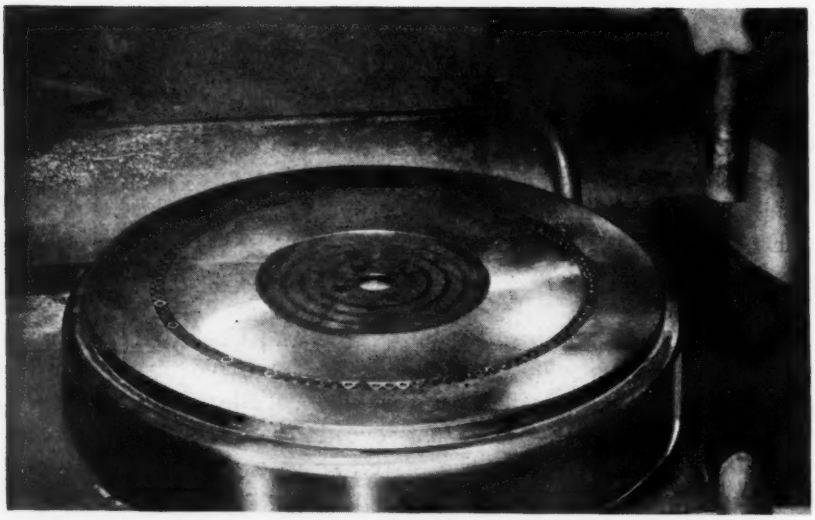


Fig. 1. Holding Small Washers on Magnetic Chuck for Grinding by Means of Two Steel Rings

Most flat surface grinding is done on magnetic chucks. Iron and steel parts, if flat enough on the chuck side, are usually held magnetically, except under certain conditions which make mechanical holding preferable.

Non-magnetic pieces can be held either indirectly by magnetism, or mechanically. When held magnetically, most work must be blocked to prevent slipping—and all work should be. Some magnetic chucks are so powerful that the tendency of the work to slip is negligible, and large, heavy pieces are kept from slipping by friction against the chuck face, so long as the magnetism is on. However, it is always conservative practice to provide mechanical stops as a

Surface Grinding

By J. C. ARNDT and W. S. HALLOWELL
Simonds Abrasive Co., Philadelphia, Pa.

precaution against failure of the magnetism due to interruption of the current.

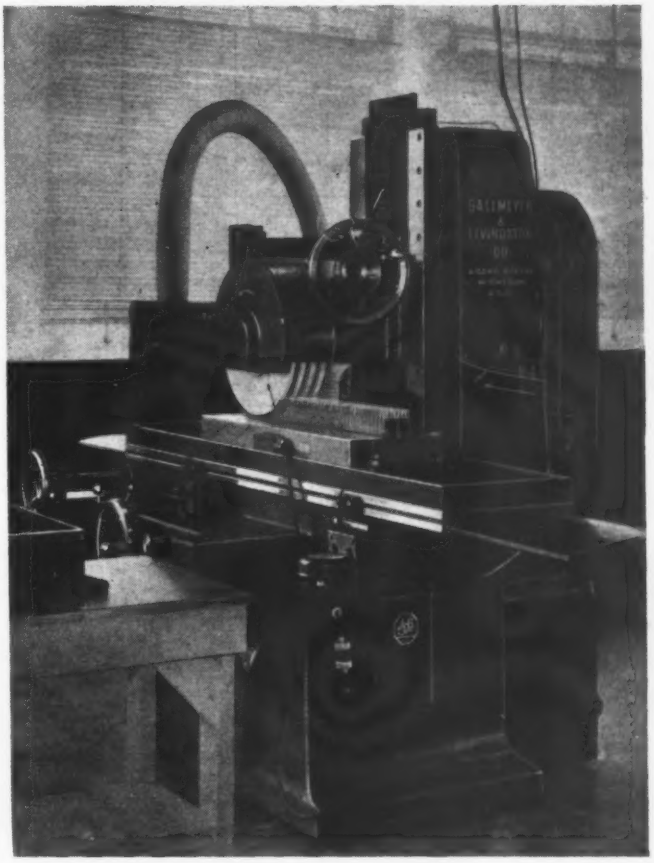
Chuck faces are broken up by inserted strips of non-magnetic material, such as brass or stainless steel, to provide numerous magnetic poles. In reciprocating chucks, these are straight lines or rectangular patterns; in rotary chucks, they are circles. Since to hold a piece securely it must span at least one of the non-magnetic strips, the strips should be comparatively narrow and close together.

The heading illustration on the opposite page shows an efficient set-up on a Gallmeyer & Livingston hydraulic-feed surface grinder. Pieces such as illustrated are very difficult to hold for grinding. Because of the small area of the parts actually in contact with the magnetic chuck, blocking at the ends is essential. Considerable wheel wear may be expected on work of this type. The heading illustration on this page shows an interesting set-up, in which a large number of small pieces are being held upright on a magnetic chuck and blocked at the end and left side of the chuck. These pieces are ground on both sides and at the top of the small foot in one operation.

The 11/32-inch diameter washers shown on a Blanchard machine in Fig. 1 are so narrow that, to hold them securely, it is necessary to straddle them over one of the non-magnetic rings. They are located there by means of two steel rings which are held to the chuck so firmly that side slip is avoided. One chuckload consists of 109 washers.

In using rotary grinders, it is the usual practice to chuck small pieces between rings as described. Generally a machine is equipped with two rings, one reaching the outside of the chuck diameter and the other large enough to leave an open space in the center of the chuck. If the entire chuck were filled with work, the area of contact between wheel and work would be so great as to reduce the grinding speed enough to more than offset any advantage that might accrue from grinding more pieces at one set-up.

Fig. 2 shows a chuck with a large vacant area in the center on a Hanchett machine. The chuck used is so strong magnetically that no center retaining ring is needed. If work has very narrow surfaces—such as rings or small bosses—it is allowable to fill the chuck clear to the center, because the narrow surfaces



Holding a Large Number of Small Pieces Upright on a Magnetic Chuck, Blocking at Back and Left Side of Chuck

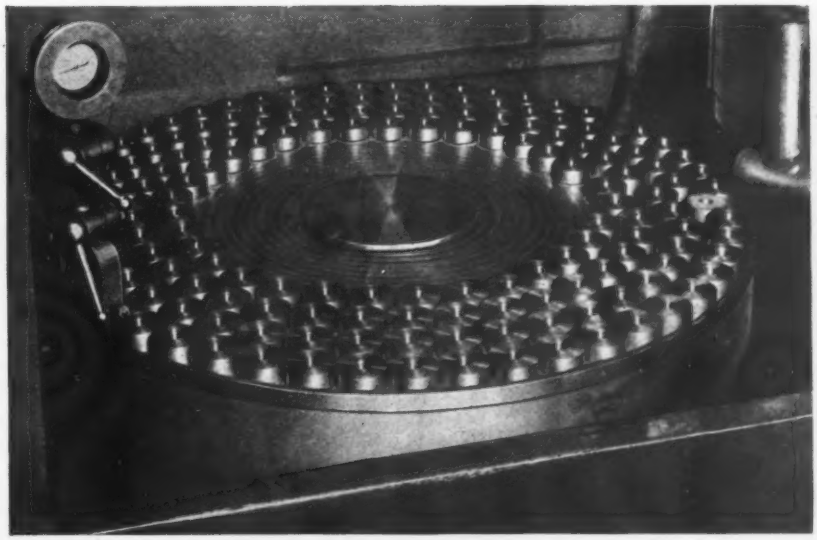


Fig. 2. Holding Parts on a Magnetic Chuck by Using a Ring on the Outside but No Ring at the Center

Fig. 3. Method of Holding Oil-well Covers for Grinding on the Flat Side Only

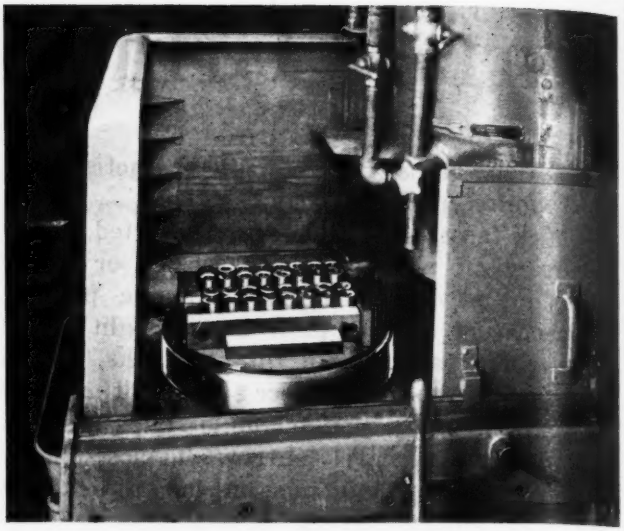


Fig. 4. Using Steel Parallels and Blocks to Hold Cast-iron Bushings for Grinding

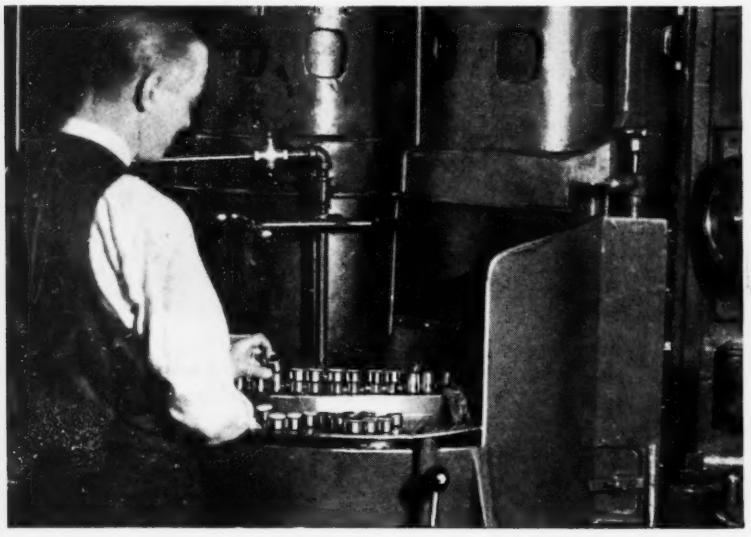


Fig. 5. Holding Trunnion Bearings in a Semi-automatic Fixture

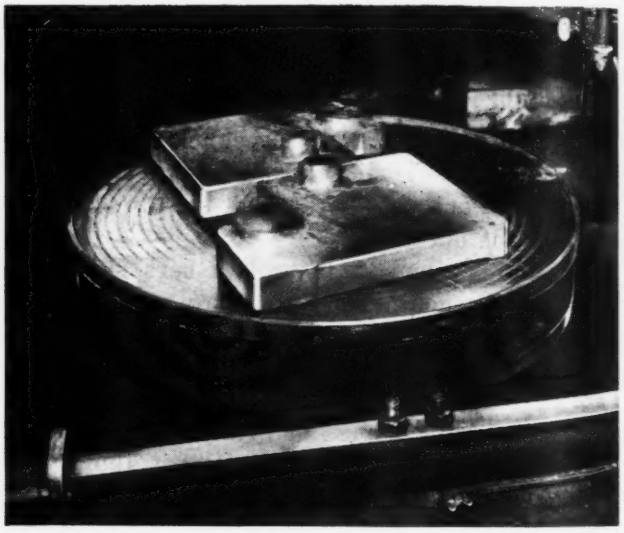


Fig. 6. Holding Pieces with Two Projecting Bosses

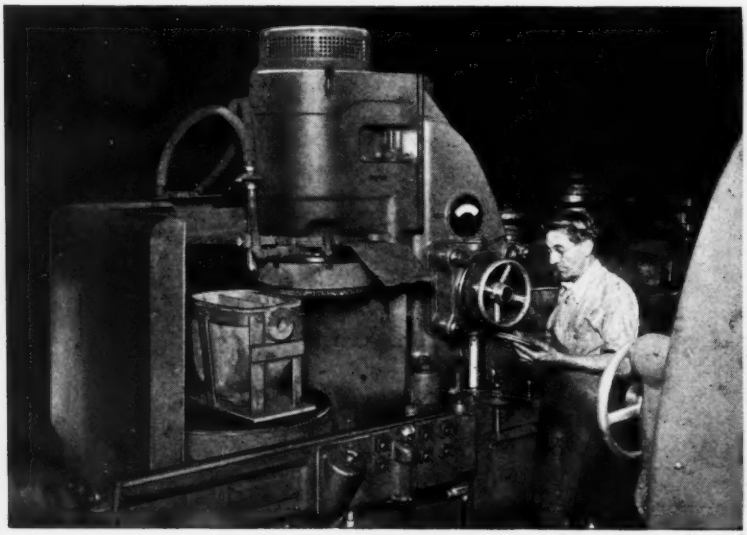


Fig. 7. Grinding Tall Piece with Small Base, Using Simple Fixture

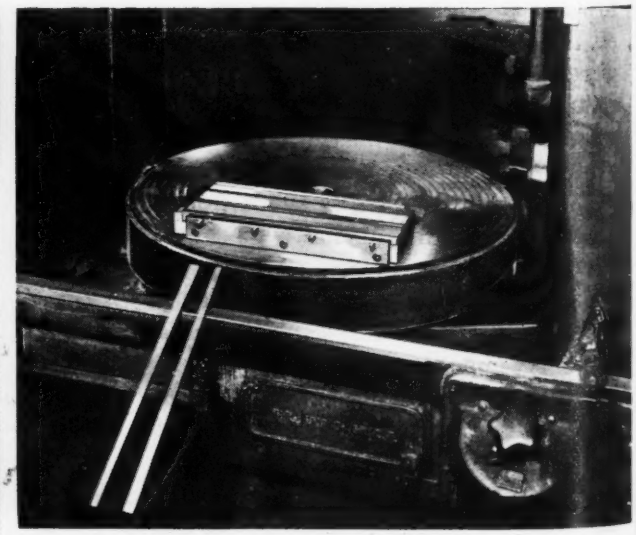


Fig. 8. Grinding Tapered Keys to the Correct Angle

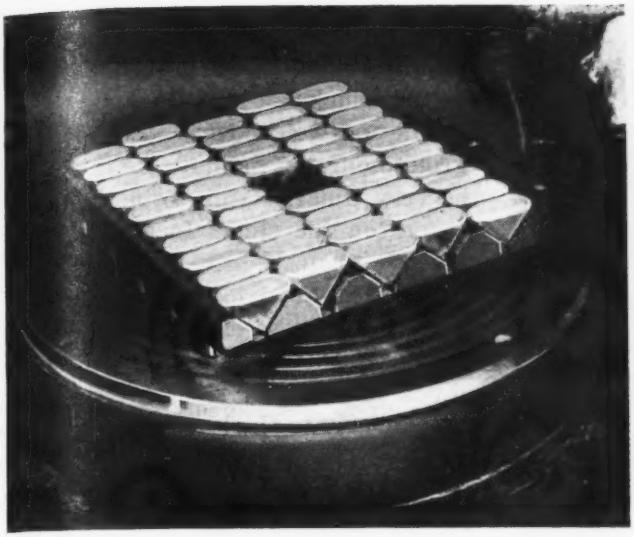


Fig. 9. V-block Fixture, Held by a Magnetic Chuck, Used in Grinding Glass Prisms

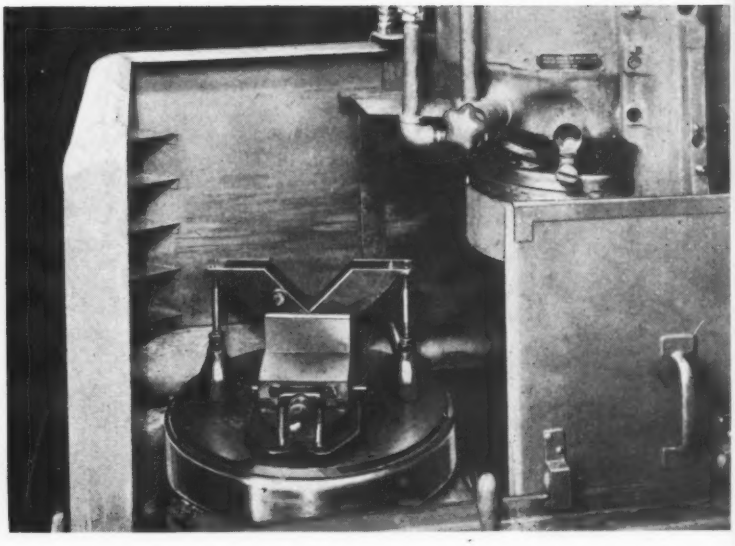


Fig. 10. Method by which a Piece of an Awkward Shape can be Held Magnetically

Fig. 11. Holding Work Mechanically for Grinding Bevel

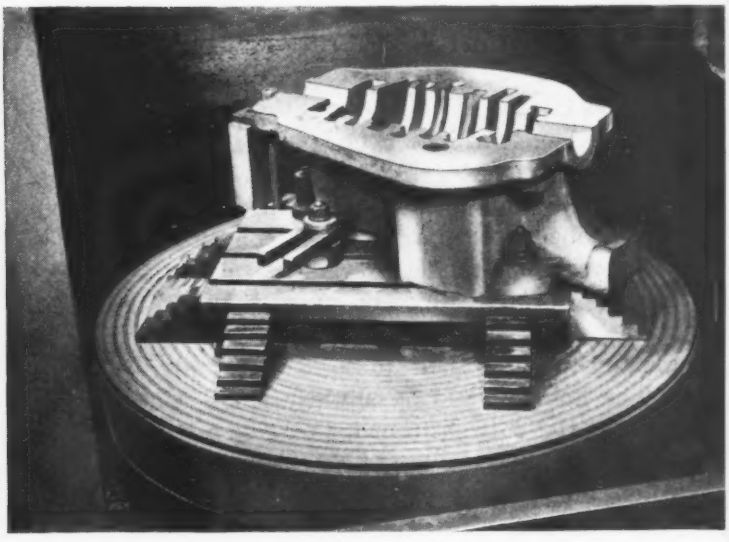


Fig. 12. Turbo-pump Casing Set up in a Simple Fixture

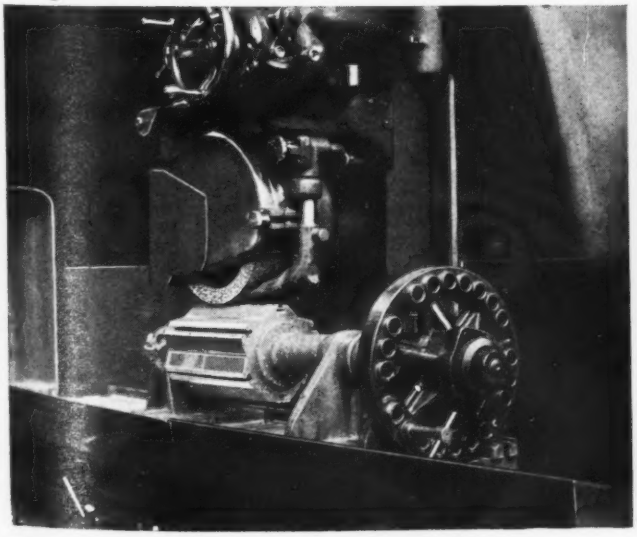


Fig. 13. Indexing Type of Grinding Fixture

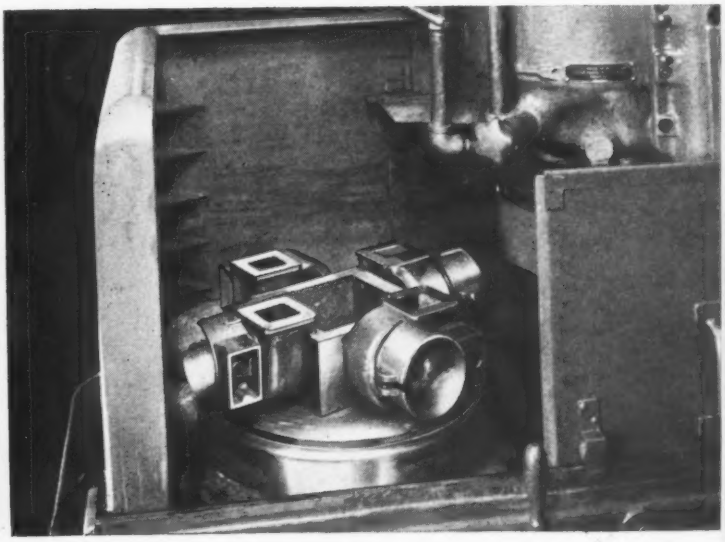


Fig. 14. Locating Housings on Plugs in Fixture Screwed to Ch

Fig. 15. Long Magnetic Chuck that can be Rotated to Any Angle

permit the wheel to cut freely even at the slow work speeds which prevail at and near the center of the chuck.

Iron or steel pieces that are too narrow to span at least one of the non-magnetic inserts will, even if placed over an insert, be held too lightly by magnetism to permit grinding. Such parts can often be held on a magnetic chuck with the help of a very simple mechanical fixture. It consists of a brass plate containing holes arranged so that the parts can be located directly over the non-magnetic strips, and just enough larger than the parts to be ground to allow them to be loaded easily.

The holes should be slightly smaller at the top than at the bottom in order to give a bearing high enough up on the piece to keep it from tipping over when pushed sidewise by the wheel. The plate should be only a few thousandths inch thinner than the pieces. It should be non-magnetic to prevent it from absorbing any of the chuck's magnetism, and should be located and held against slipping by a plug or by stops screwed to the chuck.

The oil-well covers, Fig. 3, are ground only on the flat side. It would be very time-wasting to block up the covers on the chuck face because of the two projections. However, these parts are effectively and easily supported on two steel rings laid on the chuck, and held in place by an outer chuck ring which is high enough to come nearly to the level of the ground surface. The projections do not touch the chuck face, the magnetism coming through the rings. The supporting rings are loose, and are removed with the work.

Fig. 4 shows another simple method of holding somewhat difficult parts. These are cast-iron bushings which, because their lengths are nearly twice their diameters, would have a tendency to tip over unless securely blocked. A simple set-up of steel parallels and blocks answers the purpose as well as a complicated fixture, and since all holding of both work and blocks is magnetic, the chuck can be cleared for another load of the same, or even different, parts in less than a minute.

Fig. 5 shows a method of holding trunnion bearings in a semi-automatic fixture for grinding on a Blanchard automatic two-wheel machine. The bearings are loaded by hand on magnetic studs, being located from the previously ground bottom of the bearing, and are ground on the solid end surface. As the fixture revolves, the bearings are passed under both wheels, the studs are demagnetized at the unloading position, and the bearings are automatically lifted from the studs and removed. The production is 18,500 pieces in eight hours; limits of $+0.000$ and -0.001 inch are maintained.

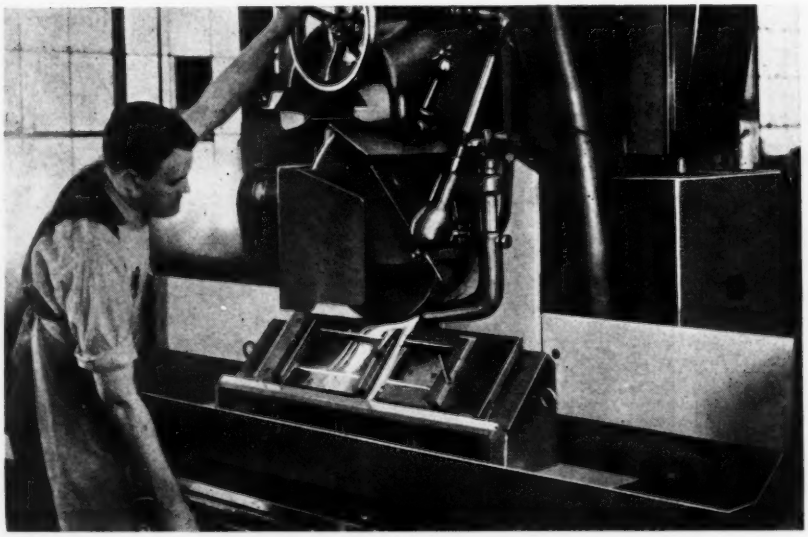


Fig. 16. Simple Angle Type Fixture for Grinding

Another piece whose projecting parts posed a problem that was not easy to solve is the cast-iron plate with two bosses shown in Fig. 6. The surfaces of the outer bosses, as set up, are 0.501 inch lower than the surfaces of the bosses nearer the center. The outer bosses are ground first, after which the wheel is raised, and the higher surfaces are ground. The plates are then turned over for grinding the bottoms. For this operation, the longer boss rests directly on the chuck, the shorter on a 1/2-inch block, and the unsupported corner of the piece on a small screw jack. The cuts are comparatively heavy—3/16

inch on each side. The tolerance is 0.005 inch; four pieces are ground per hour.

Even a tall piece with a small base does not always require an elaborate fixture. The light welded steel case shown in Fig. 7 holds a meter body 16 inches high. The production by grinding is six pieces per hour, which is twice the production secured formerly by planing.

A simple fixture for grinding tapered keys to the correct angle on a Blanchard rotary table machine is shown in Fig. 8. The fixture consists simply of a tapered shoe which holds sixteen keys. Magnetism holds the fixture to the chuck and the work to the fixture. Slipping is prevented by bars which support the shoe at the ends and sides.

Fig. 10 indicates one way by which an awkward shape can be chucked magnetically if the quantities do not warrant a fixture. Both the vises and the jacks are held to the chuck by magnetism. If a vise had not been available, heavy steel or cast-iron blocks could have been used.

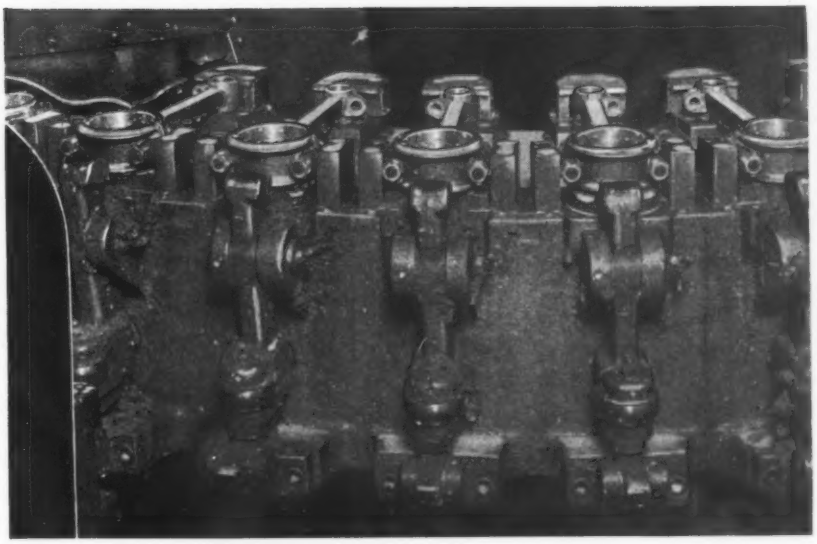


Fig. 17. Mechanical Holding Fixture for Grinding Connecting-rods

The bronze turbo-pump casing illustrated in Fig. 12 could have been set up directly on the magnetic chuck by blocking it with iron or steel blocks, but there was sufficient production to make it worth while to save setting-up time with the simple fixture shown. The piece is clamped to a T-slot plate, which is held to the chuck magnetically.

Holding Non-Magnetic Parts for Grinding

Non-magnetic parts can be held on magnetic chucks either by means of blocking or by the use of a fixture. A simple method of grinding brass rings of different diameters consists of laying one of the larger rings on the chuck face, with a smaller ring nested within the large one. Small steel blocks with sharp points to engage the rough edges of the rings are placed between them, and steel plates with points or spurs are placed against the outside ring. Magnetism holds the steel blocks securely enough to prevent slipping.

The V-block fixture shown in Fig. 9 is held magnetically to the chuck. This fixture holds forty-eight glass prisms without clamping. Such a fixture could be used for any triangular part, whether or not it is magnetic.

Two purely mechanical ways to hold pieces that must be ground on a bevel are illustrated in Figs. 11 and 16. Fig. 16 shows a simple angle type fixture on a Mattison straight wheel grinder, while Fig. 11 shows a pair of fairly heavy castings held on a rotary-table machine. One strap holds both castings during grinding. After grinding one edge, the castings are turned end for end for grinding the other edge.

Special Types of Work-Holding Devices

The steel work-slide shown in Fig. 13 is ground on all sides on a Mattison machine, accurate positioning being assured by a mechanical indexing fixture.

If a fixture is to be kept on the chuck for long periods, considerable current will be consumed to no useful purpose in holding the fixture in place between operations. It is better to screw the fixture to the chuck and use the magnetism only during the actual grinding operation.

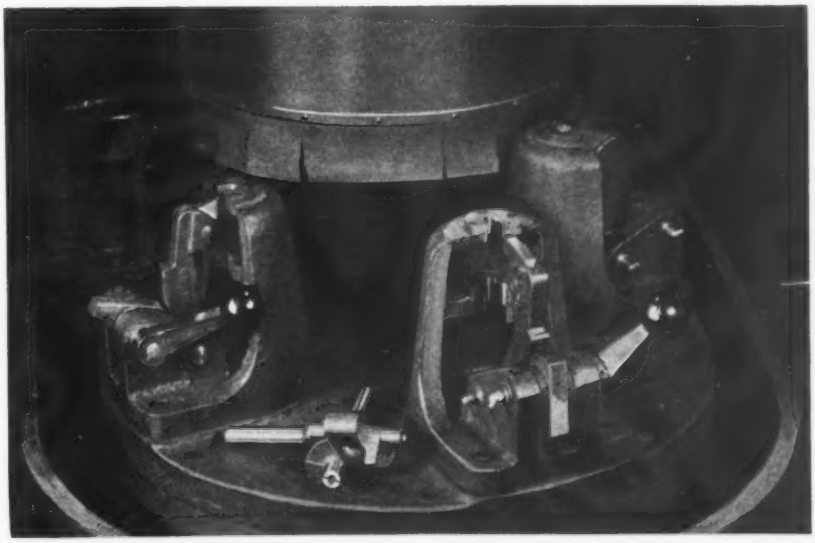


Fig. 18. Hand-clamping Fixtures for Grinding Shafts on Ends

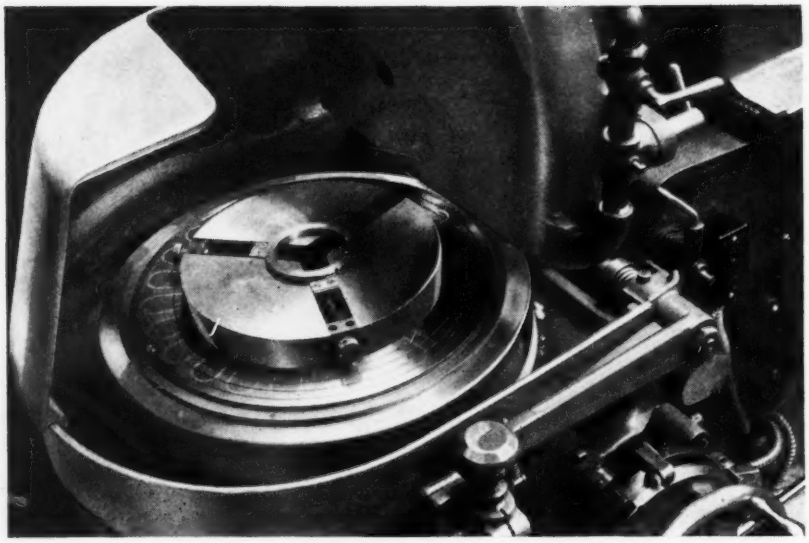


Fig. 19. Three-jaw Mechanical Chuck for Holding Non-magnetic Materials

Often it is desirable, although doing a job on a machine equipped with a magnetic chuck, to hold the work mechanically. For example, the four cast-iron oil-burner housings seen in Fig. 14 are located over plugs and clamped against the sides of a fixture screwed to the chuck. The fixture can be quickly removed by taking out four screws.

The long magnetic chuck shown on a Hanchett face grinder in Fig. 15 can be rotated to any angle. While primarily designed for holding knives, this type of chuck is widely used for any parts that have to be ground on a bevel.

The mechanical holding fixture shown in Fig. 17 was specially designed for grinding the two parallel sides of automotive connecting-rods on a three-wheel vertical-spindle machine. Both the small and the large ends of the rods must be ground, the two surfaces being in different planes. Grinding heads Nos. 1 and 2, with segmental wheels, grind the large ends, while a 12-inch diameter cylinder wheel grinds the small end. There are forty pairs of stations, such as shown, extending around the entire work-table. Since the two sides of the rods are not identical in shape, one station of each pair is arranged for one side of the rod and the other for the other side. Each rod makes two complete trips around the machine. The production rate is about 900 rods per hour, ground on both sides and both ends. The offset between the large and small ends is held to within 0.001 inch, and the rods are held to size and parallelism within 0.001 inch.

The shafts shown in Fig. 18 must be ground on the end. The simple hand-clamping fixtures shown in use on a Hanchett vertical-spindle machine are quick-acting and comparatively inexpensive.

In Fig. 19 is shown a Heald three-jaw mechanical chuck for holding non-magnetic materials and very thin disks that are likely to spring when held magnetically. The mechanical chuck is merely laid on a magnetic chuck. The mechanical chuck shown holds a brass ring.

In Fig. 20, a Heald rotary-table, straight-wheel grinder is seen grinding both ends of hardened-steel bearing rolls to a 0.0003 inch tolerance for length and 0.0002 inch for squareness. The shuttles, which hold six rolls each, are attached to the fixture plate with screws. The rolls are located from the outside in V-locating surfaces and clamped by straps, each of which holds two rolls. The rolls are loaded in the shuttles on a loading stand.

Whether a chuck is mechanical or magnetic, it is important to remember that no chuck will permit accurate grinding if it is worn, scratched, or bruised. When such signs of damage appear, it is essential to refinish the chuck by grinding. Use a soft, free-cutting wheel for this purpose. Keep the face dressed sharp, employ plenty of coolant, and use a slow table speed.

Usually from 0.001 to 0.002 inch will be enough material to remove. The chuck surface should be dull, not shiny. It should plainly show wheel marks, and should be free from any burned, glazed, or spotty appearance. If much metal has to be removed, dress the face of the wheel to roughen it just before taking the finish-grinding cut, in order to insure obtaining a good finish.

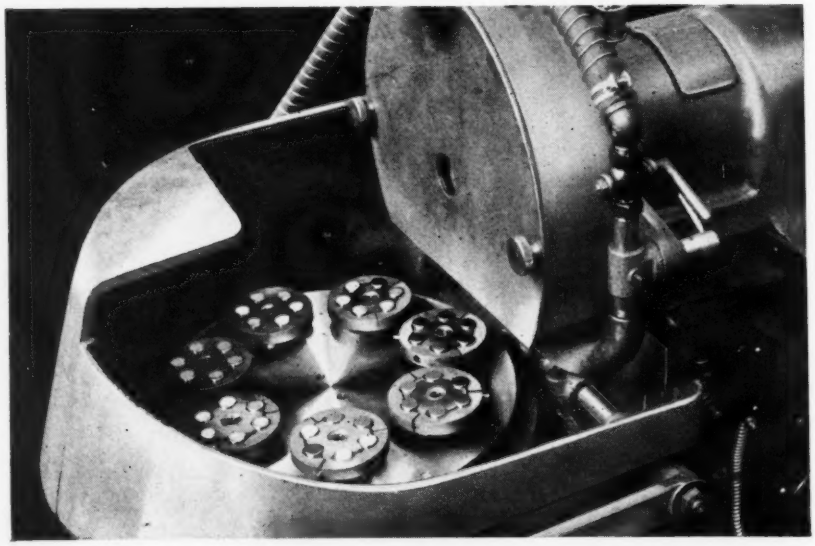


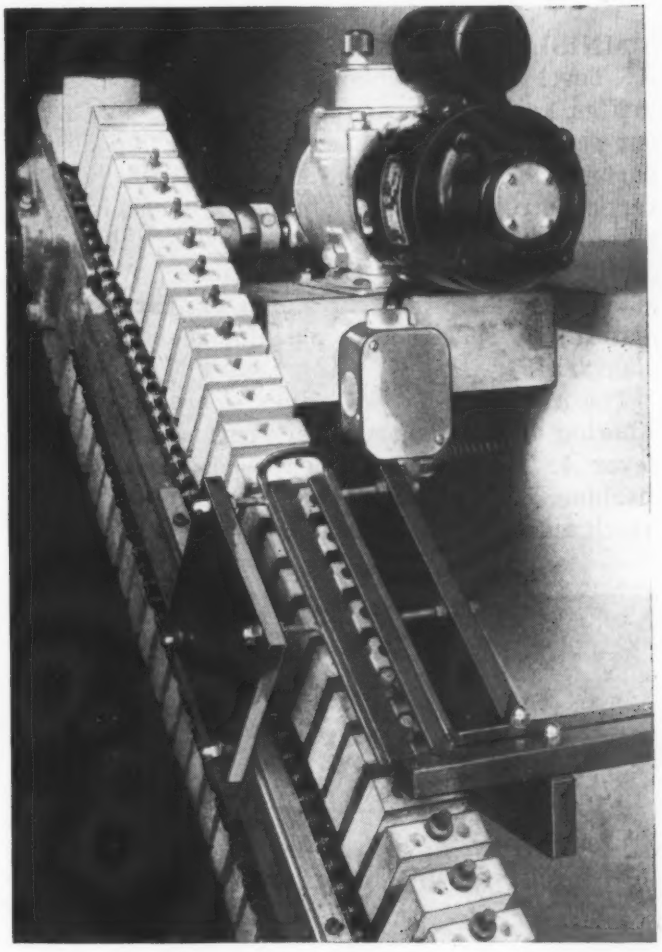
Fig. 20. Grinding the Ends of Rolls Located in Special Holders

Automatic Work-Handling Equipment Speeds up Induction Annealing of Automobile Pull-Rods

A FLEXIBLE production installation for annealing the tips of four different types of pull-rods used on automobile emergency brakes has been developed by engineers of the Induction Heating Corporation, New York City. Utilizing a single-turn, water-cooled coil, the 20-kilowatt generator can heat-treat 3200 pull-rod tips of 1/4-inch diameter or 7200 tips of 1/8-inch diameter per hour. A motor-driven chain conveyor with Transite holding blocks, made to accommodate the different types of rods, and an adjustable, conveyor type heating coil are designed especially for this annealing operation.

Since the four rods vary in tip thickness, the rate of speed of the conveyor has to be regulated before each different type is run. This is done by adjusting the control knob on the speed-reducing drive motor. In this way, a single set-up is made to handle four different parts.

The sequence of operations is as follows: The operator loads the pieces of a single type into the holding blocks at the right-hand side of the work-table. The pull-rods are annealed as they pass through the work coil on the conveyor, and at the end of the operation are released automatically into a container at the side of the work-table.



Motor-driven Chain Conveyor Equipped with Heating Coil and Holding Blocks Designed for the Induction Heating of Four Different Types of Pull-rods

U. S. No. 1 Patent was Issued 110 Years Ago

ACCORDING to the Association of American Railroads, the first United States numbered patent was for a locomotive, and was issued exactly 110 years ago. The mechanism patented was "designed to give a multiplied tractive power to the locomotive and to prevent the evil of the sliding of the wheels." It was issued to John Ruggles, who was a United States Senator from Maine and who had been largely responsible for the passage of the Patents Act of 1836 which set up the present-day system of granting patents.

Senator Ruggles' invention was a gear-like arrangement for locomotive wheels and railroad rail, which would mesh when grades were encountered. "Where adhesion of the wheel is insufficient for the purpose," says the patent application, "the cogs may be so formed as to take against the check rail in descending as well as ascending." In this connection, it is mentioned that the average American railroad locomotive today includes almost 1000 patented features.

Senator Ruggles' invention was not the first to be patented in the United States. Actually, the patent procedure dates back to 1790, the first patent bill having been signed by George Washington. However, Senator Ruggles' invention was the first to be given a patent number in a manner similar to the procedure followed in present-day Patent Office practice. Since that time, more than 2,000,000 mechanical patents and 100,000 design patents have been issued. Prior to 1836, patents were granted on the authority of the Secretary of State, and many are considered valuable historic documents because they carry the signatures of the President, the Attorney General, and the Secretary of State of that period.

Broaching Bores in Bevel-Gear Blanks on a Self-Feeding Machine

FINISH-BROACHING of the large bore in hypoid bevel drive gear blanks on the machine shown in Figs. 1 and 2 is accomplished automatically without requiring an operator to load or unload the parts or even operate the machine controls. The vertical-stroke pull-down broaching machine employed for this work was designed and built recently by the Oilgear Co., Milwaukee, Wis. The manner in which the gear blanks are carried automatically to and from the machine is shown by the diagram, Fig. 3.

The rough-bored gear blanks *G* are taken from a boring machine to the broaching machine on conveyor *A*. When each blank reaches the broaching machine, it comes in contact with a limit switch which automatically starts the loading, broaching, and unloading sequence of machine operations. Dual hydraulic loading cylinders *B* automatically move the gear blank off conveyor *A* to the broaching position, and return to their starting positions as the upper tool-handling cylinders lower the tool shank through the gear blank into an automatic puller on the main broach slide. As the broaching tool is pulled downward it accurately centralizes the gear blank by means of the conical section preceding the teeth and then broaches the hole or bore.

The tool is secured at both ends during the major portion of the broaching stroke. The possibility of sag or bend in the tool is eliminated by pull-broaching in the vertical position. When the broaching stroke is completed, the hydraulic ejector cylinder *C* automatically moves the finished gear blank onto the conveyor *D* and returns to its starting position. The main slide and tool then rise rapidly; the tool enters the upper holder and continues its upward movement. The main slide stops automatically at a pre-set point while the upper carriage and tool continue upward to their starting positions. When another gear blank *G* on conveyor *A* reaches the limit switch on the broaching machine, the dual hydraulic cylinders *B* move it to the broaching position and the cycle described is repeated.

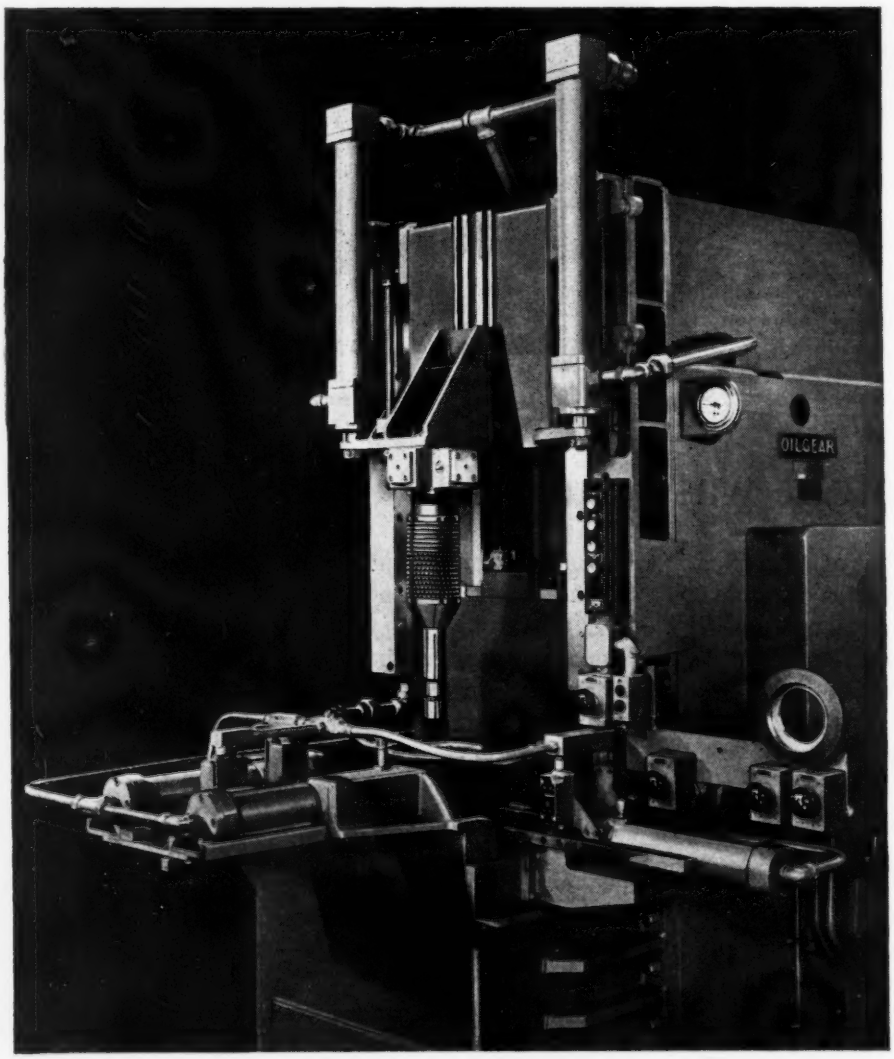


Fig 1. Right Front View of Vertical-stroke Oilgear Pull-down Broaching Machine with Automatic Work- and Broach-handling Mechanisms

If a gear blank makes contact with the limit switch on conveyor *A* while another part is being loaded, broached, or unloaded, the operating cycle is not interrupted. The machine cycle can be stopped and reversed by simply depressing push-buttons. Manual push-button operation for set-up purposes or semi-cycle operation, with manual loading and unloading of gear blanks can be employed at will by means of the finger-tip selector switch.

Approximately 0.020 inch of stock is removed from the bore of the forged-steel gear blank

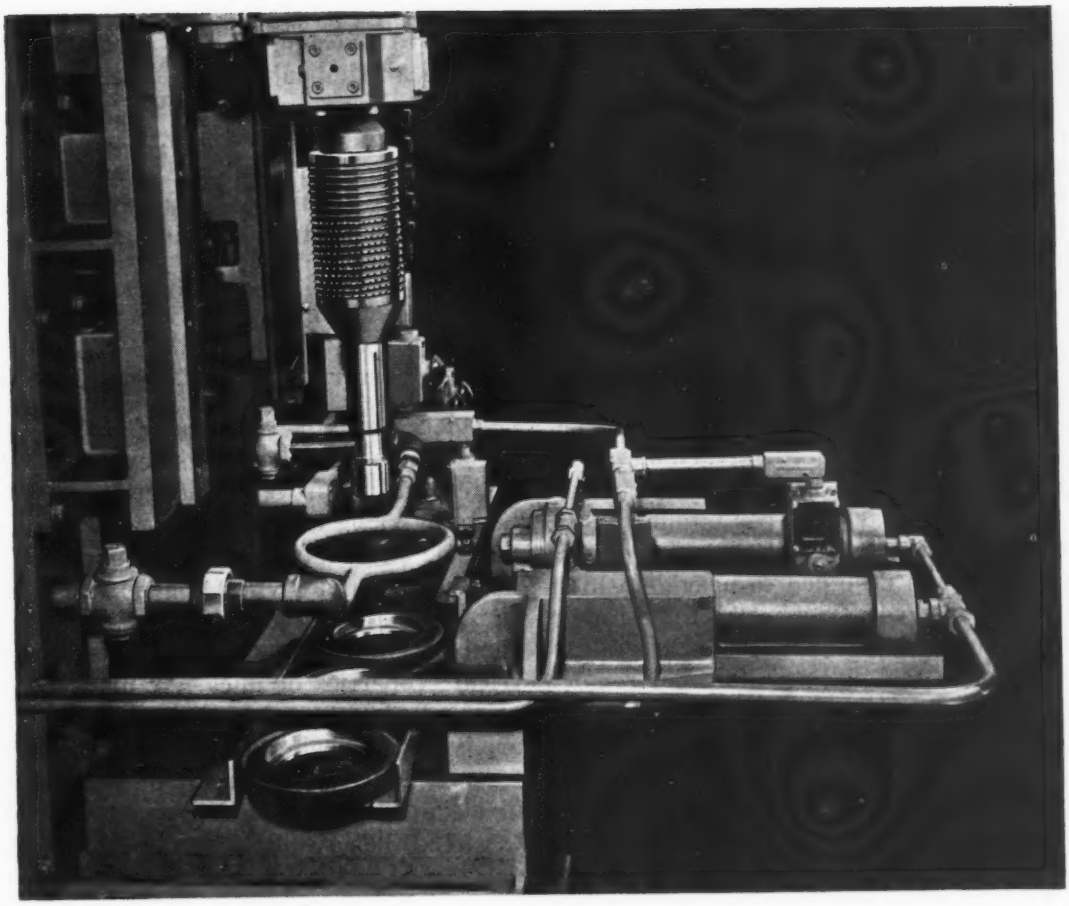


Fig. 2. Left Side View of Vertical-stroke Pull-down Broaching Machine Shown in Fig. 1 with Work in Broaching Position

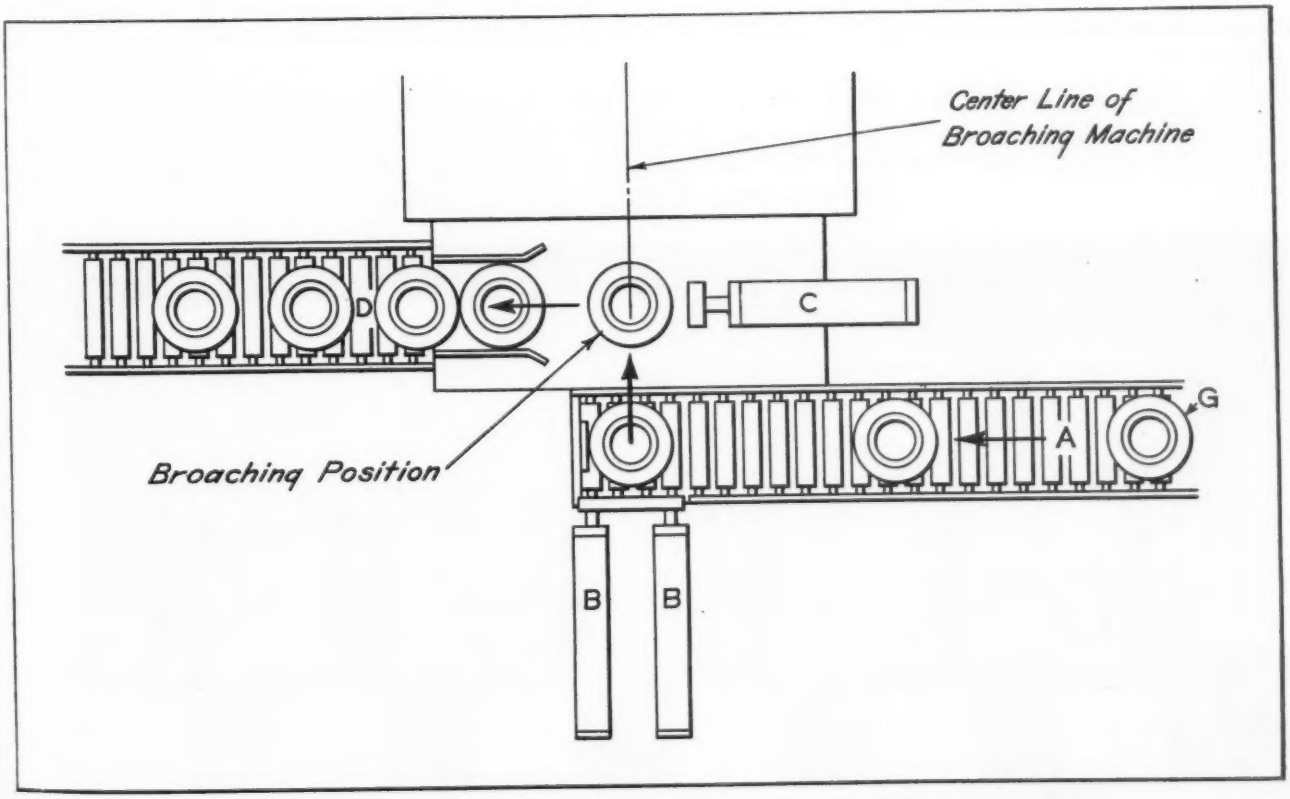


Fig. 3. Diagram Showing Arrangement of Conveyors A and D and Hydraulically Operated Cylinders B and C Used in Automatic Handling of Broaching Operation on Gear Blanks G

at a production rate of 225 gears per hour. The machine is also used for automatically broaching other sizes of drive gears, the same tool-steel bar being designed to accommodate different sized broaches.

This broaching machine is of the standard Oilgear XP-30 by 24-inch stroke vertical pull-down design equipped with the special loading and ejector cylinders operated from the auxiliary pump supply. The electric-hydraulic control is modified to provide the additional functions. An Oilgear Type DX-3511 two-way variable-delivery pump provides transmission of fluid power to the tool-pulling slide. The cutting speed is variable up to 30 feet per minute, and the return speed is independently variable up to 80 feet per minute.

The regenerative stabilizing oil circuit for operating the main slide is designed to provide a high return speed and to save power. The table top of the machine is so designed that it can be readily removed. The wide tool-pulling slide and removable puller bracket accommodate single- or multiple-tool pullers. The tool-holder bracket can be adjusted to suit tools of different lengths. Automatic pressure lubrication provides a new film of oil on hardened and ground ways and other vital points periodically at each semi-cycle of the machine. All tool-handling carriage and tool-pulling slide movements are interlocked and synchronized. Both the stroke and position of the tool-slide can be adjusted to suit the broaching operation. The pressures exerted on the broaching and return strokes are indicated on a direct-reading gage.

The Oilgear pull-down principle of operation provides for positive, continuous, and pressure lubrication of the tool and gear blank during the broaching operation. Chips fall away quickly from the tool and cutting zone into a trough in the machine base.

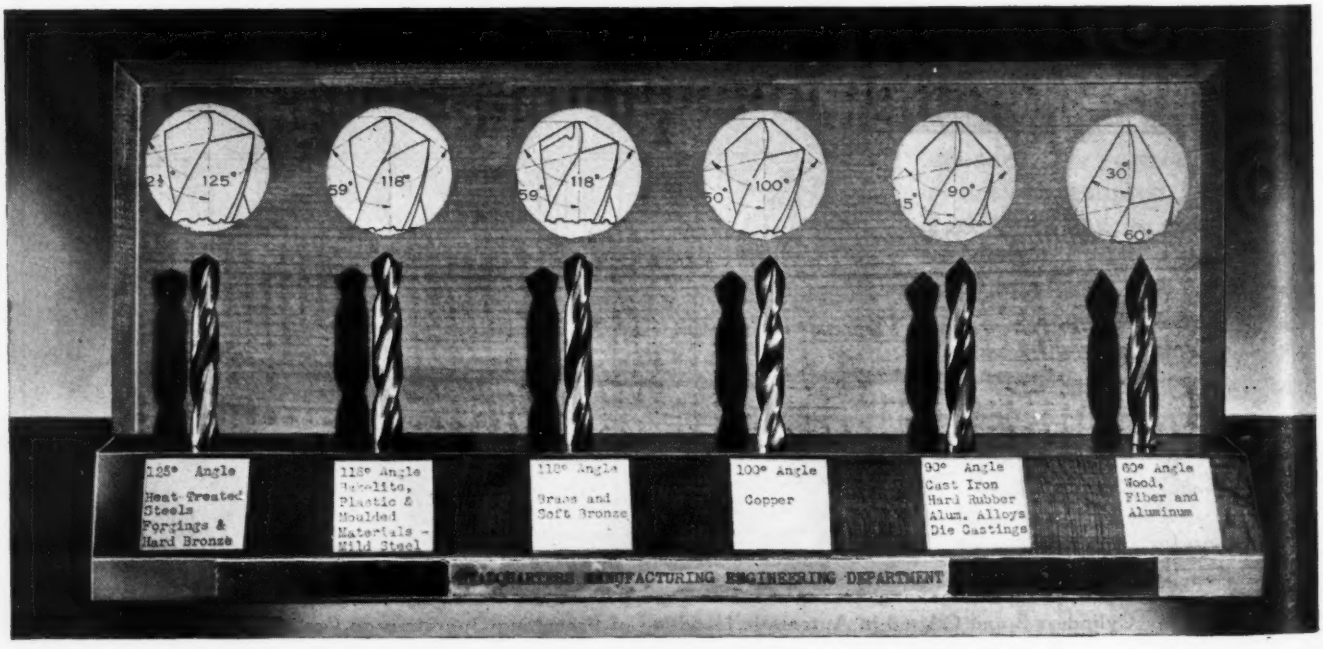
* * *

Faster Molding of Mica Parts

The chemical department of the General Electric Co. at Pittsfield, Mass., has developed a process for faster and improved production of molded mica parts by using silicone oil as a mold release agent. Silicone oil is being used as a lubricant in molding both shellac and Glyptal bonded mica. The application results in freedom from carbon and other decomposition products that adversely affect the electrical properties of mica. A marked reduction in rejected pieces is also noted, because fewer parts are broken in being removed from the mold. This feature, added to the saving of time formerly spent in cleaning gummy decomposition products from the mold, has resulted in a greater output of finished mica parts in a given time.

The high temperature stability of silicone oil, together with its low surface tension, enables the operator to apply the oil with ease to all sections of the mold while it is still heated.

A Tool Display Board that is Placed near Tool-cribs and Cutter Grinders in the Westinghouse Plants as a Reminder that Proper Tools are Essential to Quality Production. As Indicated, the Board Shows how Drills Should be Ground for Different Kinds of Metals



Condensed Review of Some Recently Developed Materials

ARRANGED ALPHABETICALLY BY TRADE NAMES

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Lubricant	**Air Luboil**	In addition to the basic oil, a detergent is provided to clean all moving surfaces. A dispersing agent prevents oxidized particles of oil sludge from being deposited on the bearing surfaces.	For use in air-driven tools.
Flat Steel Stock	**Air Tru**	A flat ground stock that is air-hardening and non-deforming. This stock machines well and can be readily filed and finished in fine die work. A black oxide finish permits scribing without use of lay-out dye.	Especially designed for use where close tolerances must be maintained through heat-treating operations, as in making jigs, gages, fixtures, tools, punch and die facings, and small precision parts.
Tinning Flux	**Airco Hi-Bond**	This flux overcomes the difficulties encountered in tinning cast iron, and makes possible highly satisfactory tinning, especially of cast iron having high carbon and silicon content or low combined carbon analysis.	For tinning cast iron prior to brazing. Does not replace the regular flux used for brazing.
Soldering, Brazing, and Welding Flux	**Amco No. 4015**	An aluminum soldering, brazing, or gas welding flux that can be used with aluminum solders or with ordinary 50-50 tin-lead solder. It has a relatively low melting point and retains its activity over a wide temperature range.	For use in brazing or welding rolled or cast aluminum. Can be employed for soldering, brazing, or welding aluminum to iron or steel and to brass, copper, Inconel, Monel, aluminum, bronze, and other alloys.
Copper Castings	**Ampcoloy 90**	Copper castings with guaranteed electrical conductivity of 90 per cent minimum. Values ranging up to 98 per cent have been obtained.	Useful for making electrode-holders for arc furnaces, electrical contacts, and castings for resistance welding machines.
Bronze Rod	**Ampcoloy 342** **Ampcoloy 382** **Ampcoloy 742**	Three continuous cast bronzes in rod form. These bronzes have an extremely uniform structure, with lead or other secondary constituents uniformly dispersed and in a finely divided state throughout. Dirt, dross, and shrinkage cavities are excluded by the nature of the continuous casting process.	For use in semi-automatic and fully automatic screw machines.
Fog-preventing Compound	**Anti-Fog**	A compound that prevents fog, mist, or steam from forming on glass or plastic surfaces.	Suitable for treating goggles, gas masks, and safety shields.
Anti-fog Compound	**AO**	This compound, when applied to glass, leaves a thin film which prevents fogging, steaming, or frosting. It also removes grease and dirt from glass.	For keeping goggle lenses, face shields, and welding plates clear.
Packing Liner Fabric	**Aquastop**	A tough, flexible, and resilient waterproof packing liner fabric made of impregnated and coated synthetic material. Although fully waterproof, passage of moisture vapor is permitted, tending to prevent condensation within the package due to temperature changes.	Used as liner in wooden shipping boxes to make package waterproof.
Welding Flux	**Autochemic Eutector**	Metal parts are coated by immersion in diluted solution.	For preventing metals that are to be heat-treated from becoming tarnished.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Internal Plating Process	**Bart Lectro-Clad**	A process that develops a smooth, ductile, pore-free nickel deposit, fully adherent to the base metal. Internally plated pipe can be welded, reduced, and bent (hot or cold) without destroying the lining.	For application to inside of steel pipe or tubing up to 18 inches in diameter with lengths up to approximately 20 feet.
Thermosetting Plastic	**BCM**	A thermosetting plastic resin with excellent bonding properties and high resistance to heat. Used with various reinforcing materials, such as glass fabric, to form laminates.	Is being tested for use in tooling jigs and for structural panels in automobiles, airplanes, refrigerators, and washing machines.
Chain Lubricant	**Botlube**	A non-staining, soapless, non-corrosive lubricant that contains no oil. It has a high degree of wetting action and forms a thin but exceptionally durable film.	For lubricating high-speed chain conveyors.
Synthetic Rubber	**Buna N 233-5**	Retains a tensile strength of over 1000 pounds per square inch and an elongation of over 100 per cent after being subjected to aircraft-engine oil at 300 degrees F. for seventy hours. Remains flexible at 40 degrees F. below zero.	Intended for use in oil-seals, oil-rings, and other applications requiring resistance to aromatic fuels.
Rust Inhibitors	**Carbo C** **Carbo N**	Two specialized types of rust inhibitors. Carbo C is inactive on all metals and alloys, including magnesium and aluminum. Carbo N has no effect on iron, steel, or ferrous alloys, but has slight action on softer metals, such as lead, zinc, magnesium, and aluminum.	For temporary protection of metal parts and materials during inside storage. Can be used to prevent rust in lines through which salt solutions are drained from crude-oil storage tanks or tanks holding water and brine.
Rust Solvent	**CarboRustex**	This solvent has an affinity for rust, but will not attack unoxidized metal. It is applied by brushing, spraying, or dipping. The solvent is non-inflammable, and is not toxic or injurious to the skin. It also provides a protection for clean surfaces against oxidation.	For use wherever rust is to be removed from metal surfaces.
Cellular Rubber Material	**Cell-Tite**	An ebony-like cellular rubber material with a high strength-weight ratio and considerable hardness. Has more buoyancy and lower water absorption than cork, a high resistance to chemical attack, and good aging properties. It can be sawed, drilled, planed, and otherwise worked, much the same as wood.	Originally utilized for airplane propeller fairings, but is now available for industrial use.
Synthetic Rubber Compound	**Chlorinated Isopol**	Synthetic rubber compound with characteristics comparable to those of chlorinated rubber.	Suitable for use as a primer for rubber-to-metal adhesion; as an ingredient in adhesives, paints, lacquers, inks, etc.; as an acid- and alkali-resistant coating for metal, concrete, and other surfaces; for fireproofing and moisture-proofing fabrics and other materials; wherever sound and heat insulation qualities are desired; and as a plastic when inertness to chemicals and fireproof properties are important.
Inoculants for Cast Iron	**CMSZ 4** **CMSZ 5**	Chief among advantages derived are increased hardness and wear resistance. The new alloys also improve the tensile and transverse strength of a cast iron and greatly reduce the tendency to "grow." They impart higher resistance to oxidation and to the annealing effect of elevated temperatures.	For use as stabilizing inoculants for cast iron for providing advantages of chromium without usual increase in depth of chill. Also serve to add strong graphitizing agents.
Hard-facing Alloys	**Coated Stoody 1** **Coated Stoody 6**	Two hard-facing alloys having a special dipped coating to make application easy with either alternating- or direct-current arc-welding equipment.	For application on all heavy equipment subject to heat, abrasion, corrosion, and impact, and for parts where oxy-acetylene hard-facing is impractical.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Iron and Steel Coloring Process	**Color Parkerizing**	A chemical immersion process that imparts colors to Parkerized iron and steel surfaces and also increases corrosion resistance. Can be applied to threaded or assembly parts.	Applicable to all Parkerized products; useful for identification of different springs, screws, etc.
Plastic Laminate	**Conolite**	A plastic laminate made by impregnating Fiberglas or Fortisan fabric with a new type of thermosetting resin. Has good resistance to salt water, benzine, aromatic fuels and acetone. Has a tensile strength ranging up to 120,000 pounds per square inch.	Used for fabricating various airplane structural parts.
Plastic Adhesive	**Cordo-Bond No. 250**	A plastic adhesive that bonds quickly by baking at 250 degrees F. under a pressure of 50 pounds per square inch. Shear strength of bonds ranges up to 2000 pounds per square inch.	For establishing strong, lasting laminations of metals, plastics, and woods in various combinations.
Silicone Greases	**DC 31** **DC 33** **DC 41** **DC 44**	Four silicone greases developed to meet the need for high- and low-temperature bearing lubrication. DC 31 is an almost completely inorganic grease serviceable at temperatures as low as minus 95 degrees F. Has satisfactory lubricating life at temperatures up to 300 degrees F. Is water-resistant under any service conditions and also resistant to oxidation by air or ozone. DC 33 is a silicone grease thickened with metallic soaps. Is serviceable over a temperature range of minus 95 to 300 degrees F. Its water resistance is comparable to that of calcium- or lithium-based petroleum greases. DC 41 does not melt at temperatures in excess of 480 degrees F. Is also serviceable at temperatures as low as minus 4 degrees F. It is waterproof and resistant to oxidation by air or ozone. DC 44 is serviceable at temperatures as low as minus 4 degrees F., and has a water resistance comparable to that of calcium- or lithium-based petroleum greases.	DC 31 is for low-temperature lubrication at operating speeds of less than 4000 R.P.M. DC 33 is for low-temperature lubrication of bearings operating at speeds up to 10,000 R.P.M. DC 41 is for lubrication of bearings operating at elevated temperatures and at speeds of less than 4000 R.P.M. DC 44 is for high-temperature lubrication of bearings operating at speeds up to 10,000 R.P.M.
Silicone Varnish	**DC 996**	Inorganic silicone compound that cures at 300 degrees F. Provides greater protection against failure due to sustained overloads; greatly increased service life of electrical insulation; and higher permissible operating and ambient temperatures.	For impregnating windings of electrical equipment.
Silicone Compound	**DC Antifoam A**	A compound that prevents foaming in chemical processes and industrial operations.	May be used to eliminate or reduce foaming of various aqueous solutions, even when subjected to steam distillation or vacuum concentration.
Silicone Mold Compounds	**DC Mold Release Fluid** **DC 7 Compound**	Silicone mold release agents which act as lubricants, reducing friction between dies and plastic materials, improving plastic flow, reducing surface striation, and affording easy release from the mold or from rubber bags used in low-pressure laminating.	For use in molding rubber and plastic materials. DC Mold Release Fluid has been especially effective in injection molding of various plastic materials.
High-speed Steel	**Desegatized Steel**	High-speed steel formed by a process that prevents segregation of free carbides in brittle mass near center of high-speed steel bars. Shows longer tool life, longer run between grinds, minimum warpage and breakage, and more consistent tool performance.	For use in high-speed tools and other applications common to high-speed steel.
Packaging Compound	**Dipwrap**	Hot dip compound that provides a tough, resilient coating for protecting machined surfaces and cutting edges. Coating is impervious to air and moisture, and prevents rust and corrosion. It can readily be removed by peeling.	For protection of metal products during shipment and storage.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Diaphragm Cloth	**DL-011**	An 80/80 base diaphragm cloth with good mechanical strength and flexibility that is practically unaffected by relatively wide temperature changes.	Developed primarily for automotive use, but recommended for applications where strength, flexibility, and temperature resistance are important.
Insulating Materials	**Dow-Corning 993** **Dow-Corning 2052**	Two of a class of organo-silicon insulating materials, known as Silicones, having exceptional heat stability, resistance to moisture, and freedom from carbonization at high operating temperatures. These insulating resins make possible higher safe operating temperatures, permitting the design of electrical equipment of increased power output, decreased size, and improved reliability.	Dow-Corning 993 is employed as an impregnant and coating for Fiberglas served magnet wire and for woven Fiberglas electrical tapes, cloth, and sleeving. Dow-Corning 2052 is intended as an impregnant and thermosetting dielectric for rotating parts of electrical equipment.
Tool Steel	**Dunkirk EZ**	Free-machining steel that hardens to about 65 Rockwell C when oil-quenched from 1450 to 1550 degrees F. Can be tempered up to 500 degrees F. without softening below 60 Rockwell C. Has high impact and transverse rupture strengths and an unusual resistance to wear and abrasion.	Specially intended for machined tool-steel parts such as dies, gages, forming rolls, bushings, liners, and bodies for multiple-edge tipped tools.
Insulating Board	**Durok**	A 100 per cent non-cotton cellulose electrical insulating board having characteristics superior to 100 per cent rag board. Also has good heat aging characteristics. Dries readily, and absorbs insulating varnish.	For applications requiring electrical insulating board.
Valve-facing Material	**Eatonite**	An alloy of nickel, chromium, cobalt, and tungsten that retains the necessary hardness at extremely high temperatures and resists the chemical action of compounds released during combustion by high-performance anti-knock fuels.	For use as a valve-facing material in airplane, truck, tractor, bus, and passenger car engines. Application is by a welding process, which bonds alloy in a groove cut in the valve head.
Chrome-vanadium Steel	**Elastuf Type A-2**	Special chrome-vanadium steel containing small controlled amounts of nickel and molybdenum, which is commercially machinable. Tensile strength, 125,000 to 160,000 pounds per square inch; yield point, 100,000 to 145,000 pounds per square inch; and Brinell hardness 262 to 341.	Suitable for use where high strength and resistance to impact, fatigue, wear, shear, and compression are called for. Also adapted to high-temperature use.
Drill Lubricant	**Elf**	Lubricant with paraffin wax base, packaged so that application is by running the drill through a cardboard container. Increases drill life by reducing breakage; prolongs sharpness; and decreases operating temperatures.	For application as a drill lubricant.
Plastic Packaging Compound	**Eronel Thermodip**	Plastic dip that coats metal products with a tough, transparent, flexible skin which can be readily peeled off.	For protecting metal parts or products during shipment or storage.
Synthetic Adhesives	**Fairprene, Type No. 1; Type No. 2; Type No. 3; No. 5105, No. 5106, and No. 5112**	These unvulcanized synthetic elastic compositions can be vulcanized with heat or are self-vulcanizing at atmospheric temperatures.	These cements are used to obtain adherence of various combinations of cured and uncured Neoprene stock, cured and uncured rubber, leather fabrics, and paper. Also used in sheet-metal joints of aluminum and Dural preparatory to welding; as binders for oil-resistant packings; and as protective coatings on wire.
Hard-facing Metal	**Fanweld**	A non-ferrous alloy for hard-facing with oxy-acetylene torch. It contains tantalum-columbium carbide, which imparts to the hard-faced surface a self-lubricating property that minimizes the destructive effects of friction, even at high temperatures.	Is especially suited for hot-work punches, dies, and tools.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Ferrous Blackening Process	**Ferrotoning**	This process utilizes simple immersion equipment, and is carried on at a temperature considerably below that required by oxide finishing. A dry or matte black finish is provided that does not chip, flake, or peel off even under repeated flexings, and cannot be removed under regular cleaning operations by the action of solvents or degreasing agents.	For blackening ferrous parts.
Plastic Tubing	**Fibron**	Flexible plastic tubing with unusual heat-resisting qualities, has ability to withstand varnish treatment and baking operations without stiffening.	For applications requiring resistance to strong acids and alkalies, denatured alcohol, petroleum and its products, and coal-tar solvents; also where high dielectric and tensile strengths are important.
Fire-resistant Chemical	**Fi-Retard Liquid**	A fire-resistant chemical applied to wooden foundry molds by dipping. Dimensions of the molds are not changed.	Used for the reduction of fire hazard by making wooden foundry molds fire-resistant.
Welding Flux	**Flo-Well No. 1**	An improved, free-flowing flux for gas welding that will not solidify or deteriorate.	Applicable to the gas welding of wrought, cast, or high-tensile aluminum and aluminum alloys of any size or shape.
Plastic	**Fosterite**	A tough moisture-proof plastic suitable as an impregnant. Almost as fluid as water, it fills completely every minute space in electrical coils and windings, and after setting, leaves no air gaps through which moisture can seep. It requires no liquid solvent, and fuses into an impenetrable solid when heated.	Used as a moisture-proof sealer for electrical parts.
Synthetic-rubber Sealing Compound	**Galco**	A Thiokol synthetic-rubber sealing compound of the Latex type, designed for spray, brush, or slush application. Has low diffusion rate, low solubility in aromatic fuel and water, high adhesion to aluminum, steel, wood, and other materials. It will maintain a tight seal over a wide temperature range.	Originally developed for sealing airplane integral fuel tanks, but is expected to have many industrial and commercial applications.
Cleaning Solvent	**G-Sol 195**	Safety solvent that is characterized by high flash point and freedom from elements of toxicity and corrosion.	Useful for cleaning precision bearings, instrument parts, and similar mechanisms where both grease and oil gums are troublesome.
Substitute for Petroleum Sulphonates	**Gunk Concentrate P-96**	This compound is diluted with about three volumes of a suitable mineral oil, and extended further with water as needed.	Used as a substitute for petroleum sulphonates or "mahogany" soaps in making emulsifiers and soluble oils for cutting and grinding operations.
High-temperature Alloys	**Haynes Stellite Alloys Nos. 21, 23, 27, 30, 31, N-155, and N-153**	A series of alloys with high tensile and endurance strengths at temperatures up to 1500 to 1800 degrees F.	Developed originally for turbo-supercharger and gas-turbine applications.
Flexible Metallic Packing	**Inconel**	This packing is made of nickel-chromium-iron alloy in wire form which has been knitted into a mesh and then braided. In addition to its high corrosion and temperature resistance, the new packing is strong, resilient, and both non-scaling and non-magnetic.	Developed to meet destructive conditions existing in exhaust systems of airplanes equipped with turbo-superchargers. Available in coil and tape forms for making ring type gaskets, and with interwoven asbestos fibers to serve as a sealing agent.
Protective Coating	**Jan-Seal**	A plastic coating applied by dipping for protection against mechanical damage and corrosion during shipment and storage.	Designed to protect gaging surfaces of plug, thread, and special gages.

Review of Some Recently Developed Materials–Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Carburizing Process	**Karbo Kasing**	Liquid carburizing process that facilitates removal of all traces of salt from oil-quenched work.	Generally applicable where carburizing is called for.
Cleaning Process	**Kolene**	Method of cleaning Meehanite bearing shells to produce a chemically clean surface with no free graphite particles. Makes possible use of lead-arsenic babbitt.	Used to obtain a surface that gives an excellent bond between Meehanite shell and babbitt metal.
Plastic Coating	**Kotol**	Plastic coating that is tough, moisture-proof, and resistant to salt water. Retains flexibility at minus 40 degrees F. Has good aging characteristics at 180 degrees F.	For protection of machine parts during shipment and as a rack coating and stop-off lacquer for electroplating.
Cleaner	**K.P.**	Soapless cleaner that lathers instantly in hard, soft, or sea water.	Can be used effectively to clean grease-caked heavy machinery and to remove grease and grime from marine engines and cargo areas.
Plastic Die	**Kriegr-O-Dip**	A black plastic die producing a permanent ebony shade.	Available in four types for use on Lucite, Plexiglas, cellulose, acetate, Tenite, Vinylite, polystyrene, and other plastics.
Thermosetting Plastic	**Kriston**	Thermosetting plastic having high optical and electrical properties, good resistance to abrasion, and high resistance to oils, greases, and most chemicals, including acids and alkalies. Can be cast in simple molds, and forms a hard, heat-resistant plastic.	For use where optical properties are called for, in various electrical applications, and where resistance to abrasion is important.
Waterproof Coating	**Liquinoleum**	A resilient, elastic waterproof coating that is highly resistant to extremes of temperature. It is unaffected by acid fumes and most chemicals, and does not crystallize on setting. A high-temperature flame will not cause this coating to catch fire, flow, or run.	For application to roofs, walls, and other surface exposed to the elements.
Ceramic	**M-244**	Ceramic material having a thermal expansion coefficient in the same range as that of Invar (a nickel-steel alloy employed in precision instruments and standard measures). It has high resistance to extreme thermal shock.	Suitable for high-temperature furnace construction; insulation for high-precision instruments in which dimensional changes must be minimized; and many other electrical and electronic purposes requiring low thermal expansion in ceramic parts.
Structural Material	**Metalite**	Structural material consisting of thin sheets of high-strength aluminum alloy bonded to a thick, low-density core of balsa wood. Also made with core material of greater density than balsa.	Can be applied where flat or curved surfaces are called for. Applications in many industries are indicated.
Laminated Plastic	**Micarta 444**	A hot-forming laminated plastic with a tensile strength of 13,000 pounds per square inch, a flexural strength of 19,000 pounds per square inch, and a compressive strength of 30,000 pounds per square inch. It does not become brittle at sub-zero temperatures nor wilt at elevated temperatures.	Both appearance and structural characteristics of this material give promise of many applications.
Corrosion Protective Compound	**Miccroloid**	Industrial maintenance coating compounded from thermoplastic resins which provides a tough, resilient, firmly adhering film that guards against severe corrosive conditions. Has most effective applications where a painted surface comes in continual contact with water or corrosive chemicals.	Applicable to plating equipment, acid and alkali rinse tanks, structural steel, factory walls and floors, pipe lines, air ducts, blower equipment, ventilating systems, process piping and tubing, water storage cases, water softening and refrigerating equipment, etc.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Plating Rack Coating	**Miccrotex**	Thermoplastic insulating electroplating rack coating that is air-drying, tough, resilient, flexible, and unaffected by any solution commonly used in plating and anodizing cycles.	Meets all requirements of plating, anodizing, tannerizing, Parkerizing, and bonderizing cycles. Can be applied by dipping, brushing, or spraying.
Plastic Tubing	**Miccrotube**	Tubing made from a tough, elastic plastic-base material that has exceptional resistance to plating baths and cleaning solutions. Withstands hot-plating solutions, including copper-plating solutions, at 180 to 190 degrees F., as well as practically all types of boiling cleaning solutions, without deterioration.	Generally used in combination with Miccrotape for the insulation of electroplating racks.
Casting Sealer	**Mogul Cast-Seal**	A compound that forms an effective seal when forced into pin-holes or cracks.	For use in salvaging defective castings.
Treatment for Plastic and Rubber Molds	**Moldeze**	Application of this liquid to molds imparts a smoother, more brilliant finish to the molded part. It also inhibits rust. The liquid does not build up a coating or film on the mold.	For use in preventing adherence of molded material to molds and in protecting mold surface from rust when not in use.
Plastic Tubing	**Natvar No. 400**	Plastic tubing superior to the former No. 200 series and having more resistance to elevated temperatures and greater flexibility at extremely low temperatures. It is chemically inert and resistant to acids, alkalies, petroleum hydrocarbons, oil, etc.	In addition to accepted use as an electrical insulation, suitable as protective covering where resistance to solvents, heat, and cold is important.
Annealing Compound	**No. 268**	Drawing and annealing compound applied as a waxy, aqueous emulsion. Tends to increase die life, reduce number of operations required, decrease scrap, and facilitate pickling. While on work-pieces, this compound also prevents corrosion.	For application to brass and steel that has to be deep-drawn.
Rust Inhibitor	**No. 303**	This compound is a water-soluble powder which is normally applied in a pickling or washing machine as a last rinse before drying. The protective coating formed is clean, dry, and practically invisible. It can be removed by a simple water rinse.	For protecting ferrous and ferrous-alloy parts from atmospheric moisture and chemical vapors between machining or drawing operations.
Manganese Alloy	**No. 720**	Manganese alloy with chemical analysis of 60 per cent copper, 20 per cent nickel, and 20 per cent manganese. A soft, ductile metal that can be hot- or cold-formed into intricate shapes and then hardened by a comparatively low-temperature aging treatment. Has high tensile and fatigue strengths.	Suitable for springs, diaphragms, and other parts of intricate shape, as well as forgings.
Cutting-oil Bases	**Nopco 1009-C** **Nopco 1009-A** **Nopco 2009-A**	Nopco 1009-C is a cutting-oil base with high sulphur and chlorine content and a specially prepared fatty oil base. Odorless and free from tarry matter. Blends in all proportions with any diluent petroleum oil. Non-rusting and non-corrosive on ferrous metals. Nopco 1009-A is a sulphurized cutting-oil base containing 15 per cent sulphur in both chemical combination and active form. Is diluted or blended with low-viscosity mineral oil. Nopco 2009-A is a base soluble in all proportions in mineral oil.	Nopco 1009-C is recommended for steel-, brass-, and copper-cutting operations in which frictional loads are extremely high. Nopco 1009-A is recommended for straight cutting operations on ferrous metals. Nopco 2009-A is used for operations requiring rapid removal of frictional heat developed under high cutting loads. Also employed where strong detergent properties are needed to remove rapidly metallic dust during grinding, broaching, polishing, or similar operations.
Corrosion Inhibitor	**Nopco 1692**	Rust and corrosion inhibitor that leaves a soft, greasy film on parts after dipping and drying. Wet articles can be treated, since water is displaced by inhibitor.	For protection of metal parts against rust and corrosion.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Brazing Flux	**Nu-Braze Wonderflux No. 4**	Silver brazing flux that melts at 480 degrees F., well below oxidation temperatures of most metals, and forms protective coating. At 800 degrees F., it readily flows through clearances as small as 0.001 inch. Contains no free fluorides.	For general brazing applications. Particularly useful where brazing alloys are used in the form of powder.
Cleaning Solvent	**Oakite No. 98**	Self-emulsifying, water-mixable solvent that is non-toxic and non-flammable in solution. Acts to prevent formation of water spots. Causes soil to float at top of cleaning tank.	For removal of light shop dirt and non-pigmented stamping compounds from steel and aluminum. Used primarily in pressure-spray washing machines.
Floor Cleaner	**Optimus No. 1F10**	Floor cleaning compound for removing oil, grease, and dirt without harming the finish. Used effectively in industrial floor-scrubbing machines.	Suitable for use on cement, Terazzo, or tile floors.
Flux- and Scale-removing Compound	**Optimus No. 3**	Compound that can be used as a mild deoxident without serious etching of the surface of most metals. Flux and welding and brazing scale are removed in from five to fifteen minutes.	Applicable to welded steel tubing; brazed, hot-rolled, and cold-rolled steel; copper; brass; welded aluminum; cast iron; bronze castings; and most aluminum alloys.
Rust-preventing Compound	**Pennsalt RI-50**	Inorganic salt mixture designed to protect ferrous metals for short periods. No rinsing is required before painting.	For use in water solution on ferrous metals before painting or enameling and between machine operations.
Adhesive	**Plasti-lock 500**	Non-thermoplastic, water-resistant and aromatic oil-resistant adhesive. In metal-to-metal bonding has shown shear strength of 3250 pounds per square inch. Best results obtained when applied under heat and pressure.	Bonding metals, wood, plastics, and ceramic materials. In some instances, can be used in place of rivets or screws.
Synthetic Adhesive	**Pliobond**	A synthetic cement that can be applied for cold-setting or under heat and pressure, depending on the requirements. It belongs to the same family of chemical compounds as synthetic rubbers.	Can be employed for bonding a variety of materials, including metals, plastics, fabrics, vulcanized rubber, paper, leather, glass, plaster, wood, and Portland cement. Any one of these materials can be bonded to any other.
Enamel	**Porciflex**	Fast-drying baking enamel with high resistance to acids, alkalies, oils, and greases. Requires baking only for periods varying from 1 minute at 450 degrees F. for sheet steel to 15 minutes at 275 degrees F. for other types of work. Is well adapted to infra-red baking. Available in wide variety of colors as well as transparent finish.	Applicable generally where enamel is called for.
Sealing Compound	**Presstico**	Produced in three types for flow gun, brush, or spray application. All three types have high resistance to dilute acids, alkalies, and mineral oils.	This compound was developed for sealing spot-welded joints.
Protective Coating	**Protecto-Coat**	Cellulose compound that provides a tough yet pliable coating. Applied by dipping and sets quickly on contact with air. Is readily removed by slitting and peeling.	For protection of tools during shipment and storage.
Plastic Packaging Materials	**Prox-Peel**	Two groups of plastic materials used to form a closely adhering protective envelope or film. One group includes a number of molten types applied by hot dipping. The other includes several lacquer types which form a film by solvent evaporation. Both types provide resistance to moisture vapor, water, and brine.	The lacquer group was developed for application to large pieces that cannot be readily dipped. Both groups are suitable for use on any type of surface, and are easily removed by stripping.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Cleaner	**PSC**	Emulsion type cleaner that cleans ferrous and non-ferrous metals and inhibits them against rust, corrosion, and hand soil. Non-toxic and non-injurious to skin. Requires no rinsing.	For cleaning, ferrous and non-ferrous metals and removing grease, oil, wax, lapping and drawing compounds, abrasive dust, chips, etc.
Grinding Fluid	**Quaker Microgrind 70**	Water-soluble grinding fluid that does not become rancid or develop disagreeable odors even when mixed with extremely hard water or when used for grinding cast iron.	Developed for use with Quaker Microgrind process. Gives excellent results on all types of steel and most other metal.
Aluminum Alloy	**R-301**	A composite alloy consisting of a high-strength aluminum alloy core, clad on each face with a corrosion-resistant aluminum alloy of intermediate strength.	Developed to provide a high-strength aluminum sheet and plate with corrosion-resistant surface.
Aluminum Alloy	**R 317**	Aluminum-copper-manganese-magnesium alloy (17 S) with small additions of other metals to improve the machining characteristics. Can be forged.	Developed primarily for machining stock. Offers advantages where forged parts with free-machining qualities are desired.
Structural Material	**Reynalite**	Light-weight, high-strength structural material consisting of two sheets of aluminum bonded with a plastic adhesive to a cellulose core. Material is easily worked and has permanent rigidity.	Suitable for construction of walls, ceilings, roofs, interior panels, doors, cabinets, refrigerator linings, electrical cabinets, air ducts, etc.
Protective Coating	**Riso**	A soluble oil applied either to metals in process of manufacture or as a final dip for blackened steels.	Used as a corrosion-resistant agent for all metals.
Rust Preventive Compound	**Ru-Pre-Sol**	A rust preventive compound that dries on the work to form a tight but invisible film.	Used as an addition to water-soluble cutting oils.
Enamel Stripper	**S-300**	Stripping compound that removes enamels cleanly by a wrinkling action. Does not attack the base metal nor are phosphate or anodized coatings affected by its action.	Useful for removing many types of organic coatings. Synthetic enamels, such as aklyds, melamine, and urea formaldehyde coatings are readily removed.
Cleaning Compound	**Sand Re-nu**	Compound used for removing pitch, resinous substances, and metal embedded in sandpaper, emery cloth, and metal files.	Flexible abrasive belts and metal files are cleaned by soaking in solution. Solid wheels, buffing wheels, and disks are treated by brushing.
Plastic Waterproof Coatings	**Saran F-120 Saran F-122**	Saran F-120 produces extremely dense, impervious coatings, completely waterproof and more moisture-vapor-proof than organic coatings. Affords close approach to metal foil from standpoint of moisture protection. Has high resistance to solvents, oils, greases, acids, and alkalies. Saran F-122 latex coatings are designed for easy application from an entirely aqueous system. Upon air-drying, tough, clear, glossy films are formed. No baking required.	For use wherever waterproof or moisture-vapor-proof protection is required.
Synthetic Rubber	**Silastic**	Group of elastic silicone products characterized by exceptional heat resistance. Remain elastic at temperatures ranging up to 500 degrees F. and retain flexibility at temperatures as low as —70 degrees F. Silastic coatings are resistant to oil and salt brines at elevated temperatures, and adhere to glass, vitreous enamel, iron, steel, and aluminum.	Used alone and in conjunction with glass or asbestos to produce flexible, waterproof, heat-stable, oil-resistant gaskets, diaphragms, tape, and electrical insulation.
Die Steel	**Silver Hardtem**	A prehardened die steel of improved service life and machinability. Can be furnished in any desired hardness.	Available as die-blocks, die-block bars, and inserts for use in zinc-alloy die-casting.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Floor Cleaners	**Speedi-Dri** **Sol-Speedi-Dri**	These two floor cleaning products quickly absorb grease and oil from any kind of floor and provide anti-skid protection. Repeated spreading tends to return floor to its original color.	Applied to floors to prevent slipping accidents and fires caused by oil-soaked conditions. Speedi-Dri is intended for use on mineral-oil soaked floors. Sol-Speedi-Dri is used to soak up soluble oils, oil and water accumulations, paints, resins, etc.
Stainless Steel	**Stainless W**	Heat-treatable stainless steel of the 18-8 type. In the annealed condition, this steel has a hardness of 22 to 28 Rockwell C, a tensile strength of 120,000 to 150,000 pounds per square inch, and a yield strength of 75,000 to 115,000 pounds per square inch. By proper heat-treatment, the hardness can be raised to 39 to 47 Rockwell C, the tensile strength to 195,000 to 225,000 pounds per square inch, and the yield strength to 180,000 to 210,000 pounds per square inch.	Many applications are anticipated, particularly in bar form. Also available for use in all commercial forms. Although stiff to work, can be used for deep-drawing.
Cleaning Compound	**Steam-Off**	This compound combines a high degree of quick cleaning action with the ability to soften the water, and rinses freely, leaving no film, curds, water spots, or streaks. It functions without loss of cleaning power in the hardest water, and prevents the depositing of hard-water scale in the steam cleaning machinery.	For use in the removal by steam cleaning of the heaviest and most stubborn grease and dirt from iron and steel surfaces, concrete, brick, and structural materials, gasoline and Diesel engines, tractors, locomotives, and road-building machinery.
Floor Material	**Stonoleum**	Is self-bonding. Can be laid over old concrete, cement, wood, or composition floors without adhesives or separate bonding agents. The material is said to feel like rubber, but to wear like stone.	As an industrial floor covering.
Protective Coating	**Stripcoat**	Metal parts dipped in Stripcoat are coated with a tough skin-tight protective layer, which conforms to the identical contours of the part and remains tough and durable throughout a wide range of temperatures. The molten material sets quickly without the aid of mechanical drying equipment.	This coating was developed to protect and package metal parts in one operation.
Plastic	**Styraloy**	An extremely light plastic that retains its flexibility at low temperatures.	When combined with synthetic rubber, imparts more flexibility at low temperatures, better electrical properties, and reduces water absorption. Originally developed for use as cable sheathing.
Polystyrene Plastic	**Styron 411**	An improved polystyrene plastic to replace Styron K-27. This plastic has increased weld strength, better machinability, and is buffed more easily. Surface marks are reduced, enhancing the appearance and adding brilliance and gloss. Welds are scarcely perceptible.	For applications similar to those of other polystyrene plastics.
Drawing Compound	**Superdraw**	Maintains inherent physical properties during repeated stamping operations on ferrous and non-ferrous alloys. Is unaffected by atmosphere, and heat, and leaves no heavy scale or stain on alloy. Is easily removed by an alkaline cleaner.	For use in stamping of ferrous and non-ferrous metals.
Brazing and Silver Soldering Flux	**Superior No. 6**	Alkaline, non-corrosive, non-fuming flux which contains no free fluorides and does not spatter, pit, or stain the metal around soldered or brazed joint. Has effective temperature range of 850 to 1650 degrees F., and tends to draw solder through small clearances and long tubular joints.	For use with any brazing alloys of low melting point or with silver solders for joining both ferrous and non-ferrous metals and alloys.

Review of Some Recently Developed Materials–Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Soldering Flux	**Superior No. 30**	Organic soft soldering flux, said to be more effective than common rosin fluxes. Although not offered as a general substitute for zinc-chloride fluxes, it can be substituted where that or similar strong acid fluxes cannot be used because of possible corrosion. Also recommended for applications where rosin alcohol is not satisfactory.	Can be applied in soldering copper, steel, silver, brass, various alloys, and electroplated parts, such as nickel plate, silver plate, and cadmium plate.
Metal Cleaner	**Swirt**	This compound is neither acid nor alkaline, and will not etch or pit ferrous or non-ferrous metals and alloys. Has a flash point of 155 degrees F. open cup. Gives off no dangerous or disagreeable odors.	For use in removing all types of soil, including grease, buffing compounds, cutting and machining coolants, and oils.
Dustproofing Compound	**Synkrete**	Liquid concentrate which, in diluted form, penetrates into concrete, filling the pores and reacting to form a hard rock-like, impenetrable mass.	To prevent "dusting" of concrete floors.
Synthetic Enamels	**Synox**	Group of all-synthetic enamels that give an exceptionally hard, stainproof finish, designed to endure heavy usage. High degree of water and alkali resistance, stain resistance, and color retention.	Designed for refrigerators, stoves, ironers, electric mixers, dish-washers, and washing machines.
Plastic	**Teflon**	Withstands acids which dissolve gold and platinum, and retains its strength and form at high temperatures.	Applicable in jet engines. Suitable for industrial uses in cases where unusual resistance to solvents and corrosive agents and heat endurance are important characteristics.
Casting Sealing Compounds	**Thalid X-100**	Series of plastic thermosetting impregnating solutions used in place of tung oil. The sealing resins have good resistance to 100-octane, 40 per cent aromatic gasoline, ethylene glycol, lubricating oil, mineral spirits, and liquid trichlorethylene.	For sealing aluminum and magnesium castings.
Thermosetting Resins	**Thalid X-500**	Group of completely reactive thermosetting resins used for impregnating fabric or paper to form a light, hard, rigid, durable product after baking. The composition of the resin can be adjusted to provide a very rapid curing after the center of the laminate reaches curing temperature.	For use in making impression moldings from molds made of wood, sheet metal, plaster, or concrete.
Thermit	**Thermicast**	New type of thermit which is supplied with a metal crucible, receiving ladle, and slag-collecting basin to produce steel castings.	For producing a mild steel of about 0.25 per cent carbon, 0.68 per cent manganese, and 0.11 per cent silicon content.
Deep-drawing Alloy Steel	**Ti-Namel**	Enamel applied to this deep-drawing alloy steel does not blister or become marked by black specks or fish-scale. This steel has excellent drawing properties, and does not age-strain, so that neither special temper rolling nor roller leveling to prevent strain lines is required. Shallow panels of large areas remain flat and true to shape and form after drawing operations.	Specifically designed for direct application of vitreous enamel without base or ground coat. Can be used for drawing many parts heretofore formed and welded.
Aluminum-Bronze Stock	**Torrance Standard Bronze**	Tough, centrifugally cast aluminum-bronze bushing stock with maximum density, uniform grain structure, and absence of inclusions.	For use in aircraft, automotive, and maritime industries, or wherever bronze bushings are required.
Protective Coating	**Triad PR**	Applied with brush or a spray gun, it forms a hard, white, dustless covering that can be easily stripped off after spraying with water or steam.	As a protective coating for the side walls of spray booths.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Heat-resisting Paint	**Triple-A**	When conditioned by heating after application, will resist water, oil, gasoline, benzol, heat, and weather. Will adhere to light steel under rapid heating and cooling when subjected to temperatures up to 14,000 degrees F. On alloy steel, brick, etc., will withstand temperatures up to 2500 degrees F. Is non-inflammable and does not give off odors when heated.	For use on interior and exterior surfaces subjected to high temperatures.
Sanitation Material	**Tri-San**	This is a mild, alkaline, free-flowing powder, completely soluble in water, forming a clear colorless, odorless solution. In dilutions recommended for various sanitary tasks, it is practically non-toxic. It deodorizes, cleans, and disinfects surfaces in one operation.	Suitable for use in wash-rooms, locker-rooms, first-aid rooms, cafeterias, etc.
Pickling Agent	**Troxide**	A dry, inert compound that is non-eruptive and non-inflammable. It gives off no "acid mist" or other toxic fumes harmful to workmen and machinery.	Suitable for removing rust, scale, tarnish, and incrustations of cement and lime from metals.
Mold Spray	**Truline Mold Spray 91**	Made from a special resin dissolved in a quick-burning solvent. Strengthens, hardens, and dries the mold surface in one application. Tends to guard against burned-out binders and green spots in the mold.	Is applicable to molds used in the production of steel, iron, and non-ferrous castings.
Tool Steel	**Type R**	Tool steel consisting of high-carbon and low-carbon steels in a composite section, providing hardness and edge-holding properties, with a high degree of shock resistance.	For use in chipper knives, planer knives, paper knives, and blades for cutting light sheet metal.
Corrosion Protective Process	**Unichrome Dip**	Converts either cadmium or zinc surfaces to chemically inert compounds. Black or olive drab finishes can be produced. Provides an excellent base for paint or lacquer.	For application to cadmium and zinc surfaces where corrosion is a factor.
Gasket Sealing Compound	**Uniseal**	General-purpose thread and gasket sealing compound that is proof against air, water, steam, gas, gasoline, oil, hydraulic fluids, and aromatics. Its solubility in alcohol and carbon tetrachloride permits easy removal.	For general thread and gasket sealing applications.
Die Steel	**Vega**	Air-hardening, non-deforming die steel with deep-hardening characteristics of air-hardening steel and responsiveness to low-temperature heat-treatment of oil-hardening steels. Can be heat-treated at 200 degrees F. lower than 5 per cent chromium air-hardening steels.	Especially suited for tools used in blanking, piercing, trimming, and forming sheet metal in both light and heavy gages.

Solid Kennametal Rolls Developed for Cold-Metal Strip Mills

Service studies have demonstrated that more strip can be produced on cold-metal strip mills with solid Kennametal rolls than with steel rolls before regrinding is necessary; thinner, harder materials can be satisfactorily rolled; accurate gage is maintained more consistently; and a superior finish is imparted to the strip.

The outstanding characteristics of these rolls, which were recently developed by Kennametal Inc., Latrobe, Pa., are great strength and hardness, which combine to provide long wearing qualities under heavy loads. Their high modulus of elasticity—two to three times that of steel—more effectively resists deflection under high pressures. The uniform, close-grained physical structure of the rolls can be given a mirror-like polish, which is imparted to the strip. The new rolls are now producing a 1.5 micro-inch finish on nickel strip, compared to the 10 to 12 micro-inch finish obtained with steel rolls. Equally good results are said to be obtained in rolling both carbon and stainless steel.

The torsion strength of the rolls, which is superior to carbon steel and only slightly inferior to alloy steels, is important where torque loads are transmitted, as is the case when the rolls are driven directly through the journals. Non-galling properties enable these rolls to hold their high luster, thus permitting the quality of the rolled strip to be maintained at a uniformly high standard.

Review of Some Recently Developed Materials—Continued

CLASS OF MATERIAL	TRADE NAME	PROPERTIES	APPLICATIONS
Plastic Resins	**Vibrin**	A line of liquid plastics which, when combined with spun glass or other fabrics, form materials that are said to have a strength per pound equivalent to that of steel. Expensive high-pressure equipment is not needed for making products from these materials.	Use of these plastics will provide stronger building materials for prefabricated housing.
Copper Alloys	**Viculoy No. 1** **Viculoy No. 2** **Viculoy No. 3**	Series of copper alloys having unusual strength and hardness properties. Viculoy No. 1 has ultimate strength of 85,000 to 95,000 pounds per square inch; elongation in 2 inches, 4 to 12 per cent; Rockwell B hardness, 94 to 96; and impact strength, 10 foot-pounds. Viculoy No. 2 has higher creep and fatigue strength and greater wear resistance than hard-drawn copper while retaining same density, coefficient of resistivity, coefficient of expansion, modulus of elasticity, and corrosion resistance. Viculoy No. 3 can be heat-treated to obtain unusual physical properties, compared with ferrous and non-ferrous alloys. Is non-magnetic and non-sparking. Has ultimate strength of 160,000 to 170,000 pounds per square inch; endurance limit, 52,000 pounds per square inch; Rockwell C hardness, 38 to 42; and impact strength, 3 foot-pounds.	Viculoy No. 1 is recommended for use when non-ferrous castings, such as aluminum bronze, manganese bronze, and yellow brass, are required, as in gears, pinions, flash- and butt-welding dies, bronze-welding electrodes and heavy-duty welding wheels. Viculoy No. 2 is recommended for use when hard-drawn pure copper is needed, such as in current-carrying parts. Viculoy No. 3 is applicable where castings must withstand shock loads, abuse, pressure resistance, high speeds, and exceptional strains without fatigue, as in gears, die molds, small machine parts, and precision bearings and bushings. Also recommended for non-sparking tools.
Aluminum Surface Cleaner	**Vulco-etch**	A method of rendering aluminum surfaces chemically and metallurgically clean by means of a chemical bath which frees surface of oxides, corrosive salts, and tenacious grease and oil films.	For preparing aluminum surfaces for spot-welding.
Plastic Board	**Walesite**	A uniformly dense, strong, light-weight laminated lignin plastic board which is resistant to water, oil, grease, and dilute acids. It can be sawed, turned, drilled, tapped, threaded, and milled with metal-working tools.	Used for making punch-press plate seats and for mounting hole-punching and notching units in presses.
Rust Inhibitor	**Witco No. 673**	When applied by either dipping or spraying, it forms a rapid drying coating that is non-abrasive, non-corrosive, and is easily removed with ordinary solvents.	For protecting metal parts and equipment during storage, shipment, and in some cases, during service.
Resin Glue	**XC-17613**	A cold-setting, phenolic, resorcinal resin glue, that provides maximum water resistance and durability for outdoor wood-bonding applications.	For bonding exterior plywood, laminated lumber, beams, trusses, and ships' keels. Also for aircraft and marine assembly.

Motion Picture on the Uses of Carboloy Cemented Carbides

A twenty-five minute sound motion picture entitled "Everyday Miracles," covering the contributions to industrial progress made by cemented carbide, has been made available to technical societies and industrial organizations by the Carboloy Company, Inc., Detroit, Mich. The picture was produced by Wilding Pictures in its Chicago studios, with many scenes taken directly in Carboloy's main plant in Detroit.

This motion picture is intended to familiarize users of cemented carbides with recent developments in this field and to stimulate thinking as to possible new applications. The story of the past, present, and possible future of cemented carbides is told in an interesting manner, and the applications of carbide tools, dies, wear resistant inserts, etc., are interestingly explained. At the end, the motion picture points out how cemented carbides, instead of being simply cutting tool materials, are actually becoming a new series of metals, the practical application of which seems to be limited only by the imagination of development engineers and designers. The distribution of the 16-millimeter prints of the picture is being handled by Modern Talking Picture Service, 340 Third Ave., New York City.

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Don't overlook the fact that it is easier to rub out lines on paper than it is to change the shape of iron and steel.

Standardization of Small Motors

IN order to improve interchangeability and to promote increased production, the National Electrical Manufacturers' Association is sponsoring a broad program of standardization for fractional-horsepower motors This program, applied to motors that have been in critical supply for some time because of material shortages and the multiplicity of designs, is expected to permit the purchasing of materials in advance, concentration of production efforts on fewer models, and the application of standard type motors to a wide variety of uses.

The new standards provide specific definitions of motor ratings and performance in terms of horsepower, speed, breakdown torque, and service factor. Fundamental points covered include not only a new basis of evaluating motor performance, but also previously standardized locked-rotor or starting currents of motors. This is but the first phase in the program, and will be followed by other items of standardization, such as dimensions and application standards for hermetically sealed motors; for belt-drive refrigerator compressor motors; for washing machine, stoker, oil-burner, belted fan and blower, and shaft-mounted fan and blower motors; and for cellar drainer, gasoline pump, and jet pump motors.

Under the new standards, fractional-horsepower induction motors can be selected more readily with a breakdown torque that is sufficient to take care of maximum peak load requirements. The breakdown torque, which is the maximum torque the motor will develop without an abrupt change of speed, has been divided into bands for the various horsepower ratings, and thus provides a definite classification of any motor in terms of horsepower.

The motors also have been classified on the basis of service factor and locked-rotor current for a given horsepower, and in terms of locked K.V.A. per horsepower. The latter designation is of value to suppliers of control equipment, while the service factor, which is the maximum loading for continuous motor operation at 50 degrees C., is an excellent guide in choosing a motor for a particular application.

Thus, the standards will be of interest to a wide range of users, who now may be sure that the stamping on the motor nameplate is an accurate designation of the capacity, and hence will obtain increased return on motor investments through proper application, freedom from trouble, and longer life. As a result, the machinery or appliance manufacturer can obtain proper motors from all suppliers without going through exhaustive engineering tests for each application or make.

The proposed standards are given in the accompanying table.

* * *

Of all the major commodities in world trade, rubber was the most profoundly affected by the war. When the United States was shut off suddenly from its Far East sources and needed rubber desperately for war and civilian uses, it created within two years facilities with an annual production capacity of more than 1,000,000 tons of crude rubber. This capacity was equal to two-thirds the world's pre-war crude rubber production. The vast bulk of that production was on the other side of the world, and before the war, crude rubber was America's largest import.

New Electrical Standards for Fractional-Horsepower Motors

Brake H.P. Rating	Synchronous Speed, R.P.M.						Service Factor for General-Purpose 40 Degrees C. Induction Motors	Locked Rotor Current, Amperes	
	3600	3000	1800	1500	1200	900			
	Full-Load Speed, R.P.M.								
	3450	2850	1725	1425	1140	850		115 Volts	230 Volts
	Breakdown Torque, Ounce-Feet								
1/20	2.0–3.7	2.4–4.4	4.0–7.1	4.8–8.5	6.0–10.4	8.0–13.5	1.4	20	10
1/12	3.7–6.0	4.4–7.2	7.1–11.5	8.5–13.8	10.4–16.5	13.5–21.5	1.4	20	10
1/8	6.0–8.7	7.2–10.5	11.5–16.5	13.8–19.8	16.5–24.1	21.5–31.5	1.4	20	10
1/6	8.7–11.5	10.5–13.8	16.5–21.5	19.8–25.8	24.1–31.5	31.5–40.5	1.35	20	10
1/4	11.5–16.5	13.8–19.8	21.5–31.5	25.8–37.8	31.5–44.0	40.5–58.0	1.35	23	11.5
1/3	16.5–21.5	19.8–25.8	31.5–40.5	37.8–48.5	44.0–58.0	58.0–77.0	1.35	31	15.5
1/2	21.5–31.5	25.8–37.8	40.5–58.0	48.5–69.5	58.0–82.5	—	1.25	45	22.5
3/4	31.5–44.0	37.8–53.0	58.0–82.5	69.5–99.0	—	—	1.25	61	30.5
1	44.0–58.0	53.0–69.5	—	—	—	—	1.25	—	—

Machine Tool Distributors Discuss Surplus Problems

THE American Machine Tool Distributors' Association, at its twenty-second annual meeting in Hot Springs, Va., September 18 and 19, gave a great deal of attention to the matter of surplus machinery disposal. While many other important problems of the machine tool trade and industry were discussed, the methods of disposal of surplus machine tools were accorded a place of primary importance on the meeting program. As a result of the discussion, which brought forth many examples of conditions requiring correction in the handling of surplus machine tools on the part of government agencies, a resolution was unanimously adopted, worded as follows:

"Whereas, the machine tool industry is basic in that it furnishes the machines necessary for production of goods and provides in war the only means of manufacturing guns, planes, ships, ammunition and other material for national defense; and

"Whereas, according to the highest authorities in the Army, Navy, and War Production Board, the industry, at great detriment to its own future, rendered outstanding service in building and distributing machine tools through trained engineering staffs; and

"Whereas, it is vital to the future protection of our country as well as to its peacetime economy that this industry be preserved and permitted to be in a position to continue its technological developments without the smothering burden caused by the dumping of war-created surplus; and

"Whereas, this industry has pursued a public-spirited attitude of opposition to any policy in disposal of surplus machine tools which would lead to speculation or to the scrapping of valuable public property, and has given freely of its personnel in efforts to assist in orderly disposal plans, and has provided from among its members experienced executives to serve on the erstwhile Government-appointed advisory committee; and

"Whereas, it is now apparent that in the administration of the disposal of surplus machine tools there is a disposition to avoid seeking the counsel of either that advisory committee or others engaged in the private business of manufacturing and distributing new machine tools, as is evidenced in the present announced intention of changing the advisory committee to a narrow and restricted committee limited to so-called authorized dealers, and by the unannounced, but nevertheless almost completed, plans to effect a change in the basic principle of pricing surplus machine tools without consultation with the advisory committee or any responsible element of the industry, and in complete ignorance of the well-founded principles and experience upon which the Clayton Pricing Formula was based; and

"Whereas, the inefficiency and lack of cooperation on the part of most of the War Assets Administration (W.A.A.) staff responsible for disposal of machine tools has been such as to greatly hamper the efforts of the industry to aid in the liquidation [In spite of these difficulties, distributors have been instrumental in disposing of a very large portion of the surplus sold to date, but an even better job could have been done with proper support and cooperation from the W.A.A.] and such inefficiencies and irregularities have been reported without any present evidence of intention to provide correction:

"Now, therefore, this American Machine Tool Distributors' Association, a national organization of more than twenty years' standing and comprising member companies handling more than 95 per cent of the machine tools sold through machine tool distributors, and having as an organization been acknowledged by high military and other governmental officials as having rendered the country an outstanding service, now being assembled in annual convention at Hot Springs, Va., this 18th day of September, 1946, does hereby resolve that:

"1. It condemns the inefficiency and laxity which permeates the administration of the disposal of surplus machine tools.

"2. It demands that the W.A.A. give proper consideration to the needs of future national defense by assisting the War and Navy Departments in setting up adequate reserves of machine tools out of present surplus stocks.

"3. It objects to the present failure to consult on matters of policy with the machine tool industry, and demands that a real advisory committee by reconstructed, and that such committee be utilized for its advice on all policy matters.

"4. It warns of the serious danger to the disposal program and to the economic welfare of the industry existing in panicky, unsound, and unworkable plans now contemplated in revision of the Clayton Plan, changes which may lead directly to unbridled speculation, and insists that a representative advisory committee be consulted before such revolutionary changes are instituted.

"5. It urges that those now in authority in W.A.A. familiarize themselves with the fundamental consequences to our country of unwise policies applied to this vital but relatively small industry and that, in harmony with the intent of Congress, they abstain from practices that may be mortally injurious to the machine tool industry and, therefore, to the future of the United States."

Present State of the Machine Tool Industry Discussed

Tell Berna, general manager of the National Machine Tool Builders' Association, presented a detailed and analytical address on the "Machine Tool Industry of Today," in which he referred to the problems created by shortages of materials and supplies. An address was also presented on the subject of "Plastics," by M. L. Macht, of the E. I. du Pont de Nemours & Co., in which the speaker briefly referred to the methods of molding and machining plastics and to some of the more recent applications of plastics.

At the annual dinner of the Association, A. B. Einig, of the Motch & Merryweather Machinery Co., president of the Association, gave a most informative address, illustrated by motion pictures, of his recent trip around the world as a member of a Government commission.

New Officers Elected

Officers for the coming year were elected as follows: President, George Habicht, Jr., Marshall & Huschart Machinery Co., Chicago, Ill.; first vice-president, D. N. Macconel, Machinery Sales Co., Los Angeles, Calif.; second vice-president, R. L. Giebel, Giebel Co., Inc., New York; and secretary-treasurer, C. C. Brogan, W. E. Shipley Machinery Co., Philadelphia, Pa.

The following members were elected to the executive committee to serve for three years: George M. Harrower, Brown & Zortman Machinery Co., Pittsburgh, Pa.; H. A. Perry, Perry Machinery Co., Dallas, Tex.; and George E. Young, C. H. Gosiger Machinery Co., Dayton, Ohio.

Features of New Line of Westinghouse Motors

A POSSIBLE production of 6,000,000 motors in the next four or five years has been anticipated by the Westinghouse Electric Corporation in tooling up its new Buffalo plant. Highlighting the output of this plant will be a new line of induction motors that will be available in ratings of from 1 to 300 H.P.

The new motors were designed as the result of a survey among such users as machine tool, automobile, and general machinery manufacturers. The improvements they requested—increased ruggedness, better performance and appearance, and less maintenance—have been the basis of the design. These motors are of all-steel construction instead of being made of steel and iron castings, as in conventional types. The motors will be from 30 to 50 per cent smaller in size and weigh proportionately less.

Many parts of open-protected motors, splash-proof motors, and totally enclosed fan-cooled motors of the same horsepower rating are interchangeable in the new design. Both end bells of open-protected motors are identical in construction. Provision can be made for mounting the same motors on a floor, wall, or ceiling by merely changing the setting of the end bells on the motor housing. A splash-proof model can be obtained by changing the position of brackets on the open-protected motor and adding another pair of hoods, while a totally enclosed motor is provided by adding a larger blower and different sets of hoods and end bells.

Interchangeability has been made possible by the use of steel parts machined to close tolerances. While cross-sections are of the same thickness as when iron castings were employed, the use of steel permits a more integral construction through the elimination of the excess material provided on castings. In an open-protected motor of 7 1/2-H.P. rating, the reduction in volume is 35 per cent, while in a totally enclosed fan-cooled motor, the volume reduction is 44 per cent. Because of the decreased weight, starting torques have been increased as much as 134 per cent per pound of motor, and maximum torques as much as 116 per cent per pound.

Another feature of the motors is the use of prelubricated sealed ball bearings. These bearings, greased and sealed before being installed, are expected to operate a minimum of five years before requiring attention.

* * *

Disabled workers experience one-third fewer serious accidents than able-bodied employes exposed to identical work hazards, according to a survey recently made by the Bureau of Labor Statistics of the United States Department of Labor. The study placed the accident frequency rate for impaired workers at 8.3 injuries per 1,000,000 man-hours worked, in comparison with 11.8 injuries for unimpaired workers.

Tool Engineering IDEAS

Quick, Accurate Means of Locating Work on Machine Tool Table

By JAMES W. CARR, Oil City, Pa.

The tool to be described was designed to save time and obtain greater accuracy in locating various sizes of work-pieces on the table of a jig-boring machine. It can, however, be adapted to other types of machine tools, and its range can be increased by using a longer bar. The particular tool illustrated can be used to locate holes from 1/8 inch to 34 inches in diameter.

The tool consists essentially of a graduated ring, a shank that fits the spindle of the machine tool, an extension bar, a dial indicator, and an indicator support. The ring is split to facilitate mounting, and each half fits the spindle of the machine directly above the spindle quill. The two halves of the ring are clamped together, around the spindle, by means of two fillister-head screws. When clamped, the bore of the ring is a tight fit on the spindle, and the ring turns with the spindle. The periphery of the ring is divided into four equal segments, two alternate divisions being marked 0 and the other two 1. A reference line is scribed on the quill to permit accurately indexing the spindle a quarter, half, three-quarters or a full revolution. A dial indicator with universal attachment is used on the tool. The addition of a small spring behind the stem of the indicator insures that the point of the universal attachment will be kept in contact with the indicator stem, and prevents it from dropping when the indicator is moved from one position to another.

The steps in locating the edge of a work-piece beneath the center of the spindle of the machine are illustrated in Figs. 1, 2, and 3. After aligning

Fig. 1. To Align the Edge of a Work-piece beneath the Center of a Spindle, the Contact Point of the Universal Attachment of an Indicator is Made to Touch the Edge and the Dial Indicator is Set at Zero

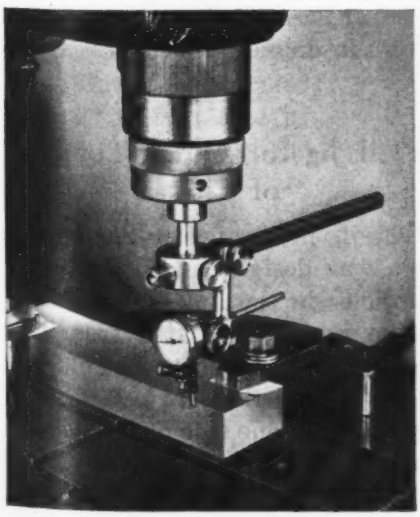


Fig. 2. Then the Spindle is Turned Half a Revolution, a Parallel is Placed against Edge to be Located, and Point of Attachment Brought in Contact with Parallel. Table is Moved a Distance Equal to Half Indicator Reading

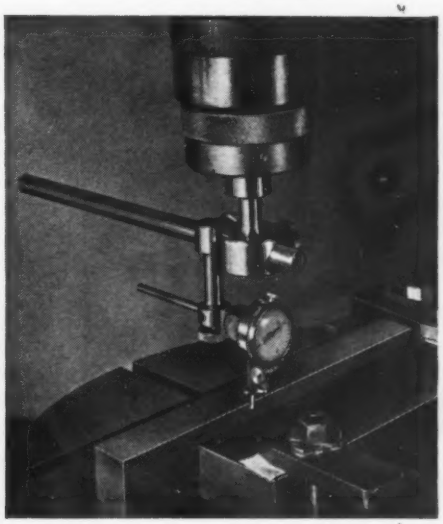
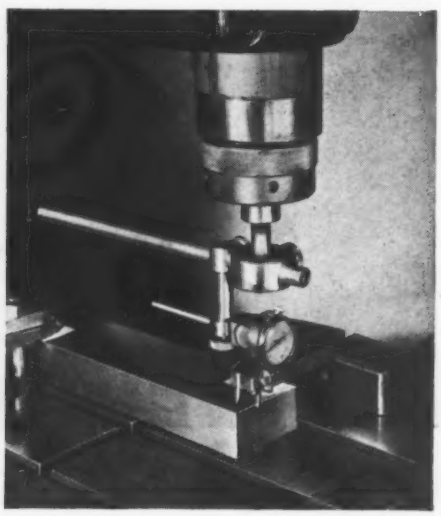


Fig. 3. To Locate an Edge at Right Angles to One Already Located, Spindle is Turned a Quarter Revolution and Table Moved until Indicator Registers Zero when Point of Attachment is in Contact with the Edge



the edge of the work in the plane desired and clamping the work to the table, the table is moved to bring the center of the spindle approximately over the edge of the work. The tool is then mounted in the spindle, the graduated ring is set at 0, and the dial on the indicator is moved to bring the needle over the zero position. The spindle is now brought down and the table is moved to make the point of the universal attachment touch the side of the work, as shown in Fig. 1.

Next, the spindle of the machine is raised, lifting the indicator above the work, and turned one-half revolution, which will align the reference line on the quill with the 0 graduation on the opposite side of the ring. A parallel is then placed firmly in contact with the edge being located, as shown in Fig. 2, and the indicator is again lowered.

When the point of the universal attachment comes in contact with the parallel, the reading on the dial indicator is noted. The table is now moved a distance equal to one-half the indicator reading. The direction of table movement depends upon whether the indicator reading is plus or minus. For example, if the reading is plus 0.010 inch, the table is moved 0.005 inch to the left in order to align the edge.

After moving the table, the process is repeated to make sure that the center of the spindle is exactly above the edge of the work, in which case the indicator will register zero in both positions.

To locate an edge beneath the center of the spindle that is at right angles to another edge already located, it is only necessary to turn the spindle one-fourth revolution, which will make the reference mark on the quill align with the number 1 on the graduated ring, and move the table until the indicator registers zero when it touches this edge, as shown in Fig. 3.

To keep the first edge under the center of the spindle also, which would mean that the intersection of the two edges or corner of the work-piece would be exactly beneath the center of the spindle, it is necessary to note the distance that the table was moved to the left. By keeping the second edge beneath the center of the spindle and moving the table the same distance to the right, the intersection of the two edges of the work-piece will come beneath the center of the spindle.

To locate the central position between two parallel edges beneath the center of the spindle, the table is moved so that the spindle will be approximately half way between the edges. The reference line on the quill is then aligned with 0 on the graduated ring, the point of the universal attachment is brought into contact with one edge without moving the table, and the dial of the indicator is moved to bring the needle over the zero position.

The spindle is now raised so that the indicator will clear the work-piece, and turned half a revolution. Next, the spindle is lowered to bring the attachment point in contact with the opposite edge. The reading of the indicator is noted, and the table is moved a distance equal to half the reading in a direction corresponding to the reading. This location is then checked, as outlined, to insure that the indicator will read zero on both edges.

To locate a hole in the work-piece that is at right angles to the spindle, it is necessary to place a plug in the hole and locate from both sides of the plug by the method described. The many other ways of using this locator will be apparent to a toolmaker. The range of the tool is indicated by the set-up shown in Fig. 4, where it is being used for locating holes in a bolt-circle jig 32 1/2 inches in diameter.

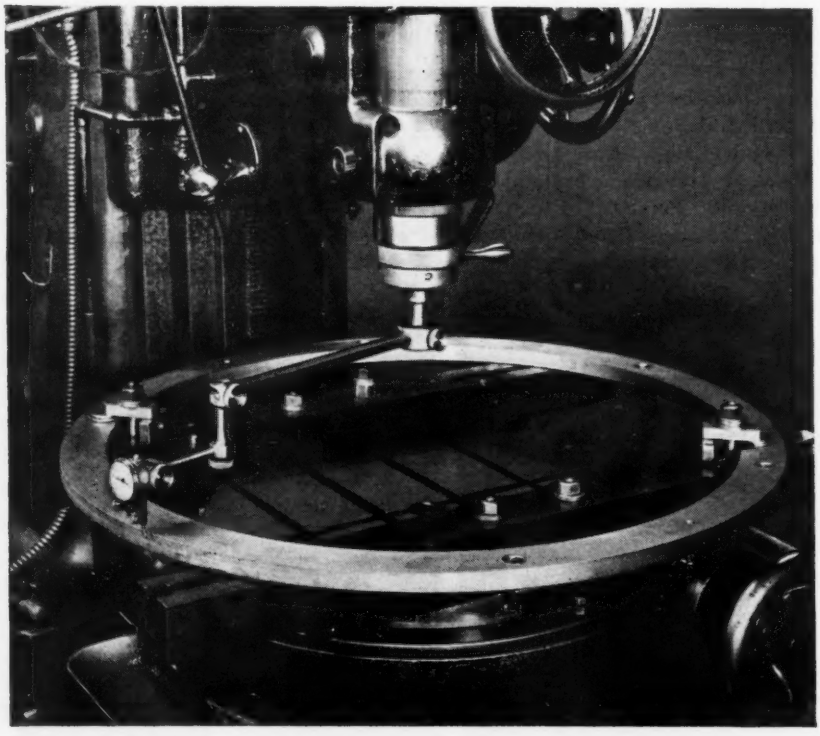


Fig. 4. Locating Tool being Applied on a Bolt-circle Jig 32 1/2 Inches in Diameter

Drill Jig for Quick Loading of Links

The jig illustrated on the opposite page was designed for drilling the two holes in the link *X*. The body of the jig is fabricated from mild steel, welded as shown. The block *E*, which carries the screw *F*, is fitted into a slot in one side of the jig. The block is positioned so that the screw operates at an angle of 20 degrees.

Quick Loading Drill Jig for Links

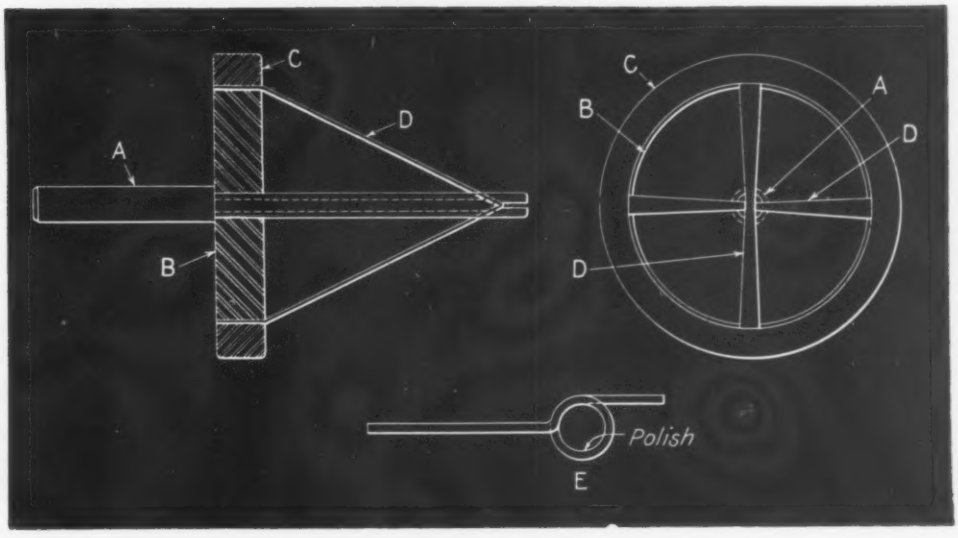
The hardened bushings *C* provide support for the link. When the link is placed in the jig and the screw *F* tightened, it is pushed into the vee formed by the pins *G* and centered against the pin *D*. This provides a quick method of loading.

Tool for Polishing Internal Curves of Symmetrical Parts

By HAROLD E. MURPHEY, Westerly, R. I.

The internal curves of symmetrical parts, such as the eye for a thread guide shown at *E*, can be polished quickly by means of the tool illustrated. The larger diameter end of spindle *A* is held in the chuck of a high-speed drilling machine or polishing lathe. The work-piece is held by hand, around the smaller diameter end of the spindle, and pushed against the revolving emery or crocus cloth strips *D*. The cloth strips will assume the desired shape and impart a high polish to the surface. Formerly polished by hand at the rate of twenty-five per hour, the thread guide eyes are now polished with this tool at 150 per hour.

The spindle *A* of the tool is turned on a lathe to a smaller diameter for approximately two-thirds of its length. Two slots are milled in the turned end, as shown, through which the narrow strips of fine emery or crocus cloth *D* pass. These strips are held on disk *B* by collar *C*. Disk *B* is a press fit on spindle *A*, and collar *C* is a push fit on disk *B*.



Tool for Polishing the Inside of an Eye for a Thread Guide Shown at E

Convenient Location of Chuck Wrench Speeds Up Lathe Work

By DONALD A. BAKER
Pilot Instrument Co., Boonton, N. J.

Production cutting of short lengths of thin-wall tubing and other short-cycle lathe operations that require frequent opening and closing of the lathe chuck can be speeded up by the convenient location of the chuck wrench.

One handy method of mounting the wrench is to suspend it above the lathe chuck. This can be easily accomplished by fastening the wrench to a cord, which passes around two pulleys located above the lathe. The other end of the cord can be attached to a counterweight. Thus the wrench is instantly available for use.

* * *

Precision Balls Made of Tungsten Carbide

New manufacturing methods have made it possible for Industrial Tectonics, Ann Arbor, Mich., to produce tungsten-carbide balls in many sizes with precise dimensional accuracy. The hardness, corrosion resistance, high compressive strength, and wear resistance of such balls make them particularly adaptable for burnishing and polishing operations, for use in check valves, and for service as special bearings. For special applications, such as in tube drawing and bending equipment, the balls can be furnished with holes to permit the attachment of wires and cables.

Cost-Record System for Machine Tools

Newly Devised Card System Provides a Multiple Check on All Major Machines in a Plant and Shows Both First and Maintenance Cost of Each

By HOWARD A. MUIR, Methods Department
Massey-Harris Co., Racine, Wis.

A COMBINATION machine tool history and repair cost system that was devised to show the true operating expense of each machine in terms of mechanical repairs and lost man-hours has been responsible for a decrease in the "down time" of machines and an increase in over-all plant efficiency. In effect, this system is a perpetual condition inventory of all the major machines in the organization. Simplicity being the keynote, any employe can locate a record in the master file and quickly obtain such vital information as the age, condition, capacity, and cost of a machine.

The operation of this plan calls for four identical files—one maintained in the master mechanic's office, another in the cost department, the third in the accounting department, and the fourth in the planning and methods department. These files are posted daily. When a machine is sold or scrapped, the records clerk maintains data concerning disposition of the unit, but places the card in an inactive file to eliminate confusion. This arrangement gives the company a quick follow-up on inactive equipment, acts as a guide for repairs or replacements, and permits such repairs to be made with a minimum of lost time and productivity.

At the inception of this system, a machine condition code was created, in which all equipment except cranes, chain hoists, heaters, and other miscellaneous facilities were catalogued according to

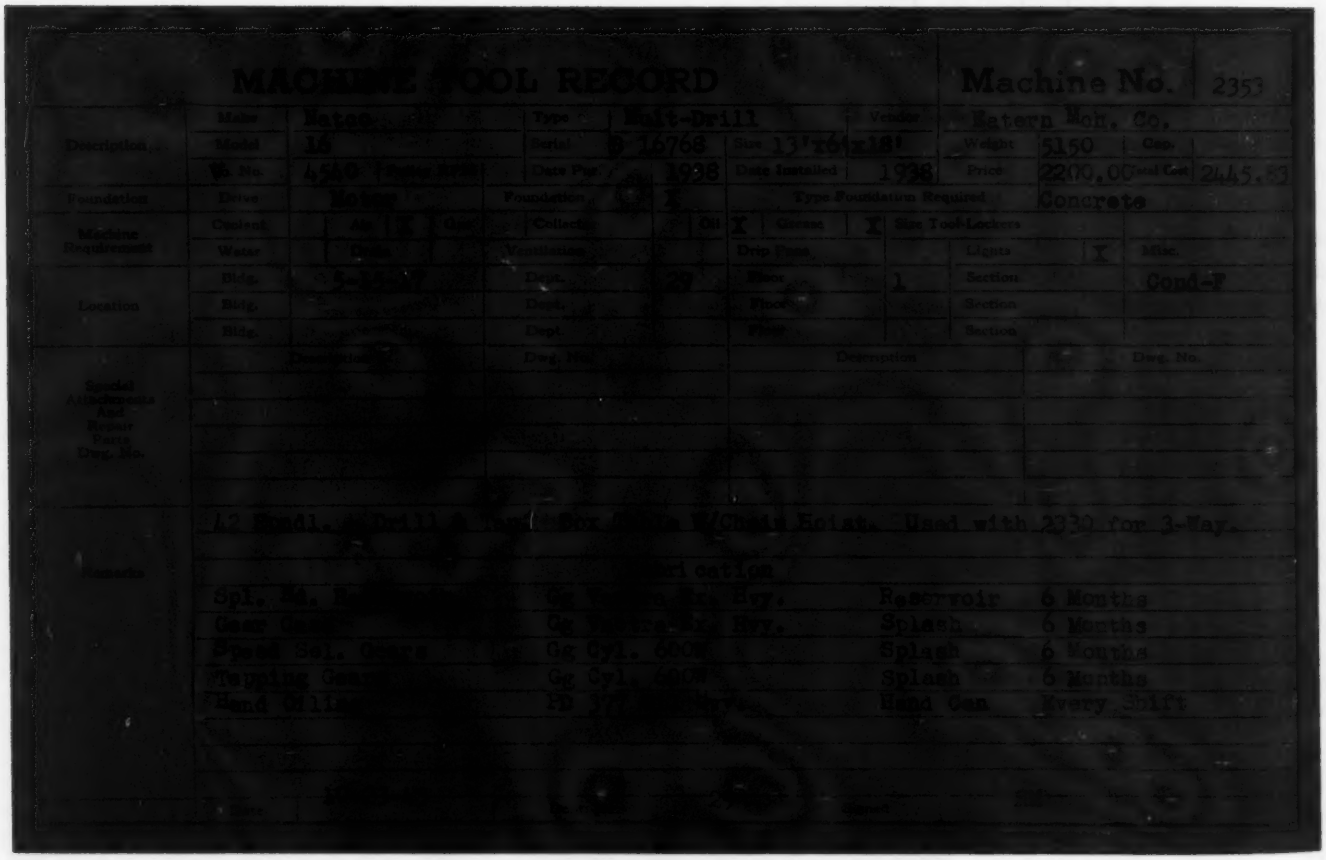


Fig. 1. Basic Data on All Major Machines in the Plant is Recorded on This Chart. Among Other Uses, the Card is of Help in Insuring Good Lubrication and in Estimating Budget Requirements

the following classifications: N, new; E, excellent; G, good; F, fair; P, poor; and V.P., very poor. All pieces of major equipment were inspected by the department foreman, the maintenance foreman, and a methods engineer; the opinion of these three men determined the condition classification of each machine. At regular intervals, the maintenance supervisors perform follow-up inspections. Machines classified as "very poor" are scrapped, and those given ratings of "Poor" receive immediate repair service. If the necessary repairs require too much time and expense, these machines also are scrapped.

The designers of the record card for the plan recognized that the card was to serve the purposes of many people, that these people were engaged in widely divergent activities, and that, being busy, they would want the information to be concise. As a result, a 5- by 8-inch card was decided upon, one side of which was devoted to a machine tool record, Fig. 1, and the reverse side divided between the machine repair cost record and the motor attachment cost record, Fig. 2. One card was made out for each machine, the card bearing the assigned machine number. There is no relation between the motor and machine numbers; all numbering of machines and motors starts at 1.

The machine tool record side of the card contains such data as make, type, model, serial, floor size, weight, capacity, pulley speed, type of drive, capital cost, date of installation and installation cost, condition, etc. This side of the card also carries information on the type of coolant to be used. Space is provided for three changes of location of the machine, as well as space for a description of special attachments and repair parts and their drawing numbers.

A lubrication survey of each machine was made by competent plant engineers. The result of their recommendations is also typed in the "Remarks" section of the card. Recognition of proper and sufficient lubrication for equipment has resulted in many dollars saved and avoided costly breakdowns at critical times.

On the reverse side of the card, Fig. 2, space is provided for a record of machine breakdown costs. This section contains information vital to the maintenance of proper cost records, and has space provided for recording such items as the expense order number, cause of breakdown, date repaired, operator's name, lost production hours, labor and material costs, and total cost of the breakdown.

At the bottom of the machine repair cost record is the section entitled "Motor Attachment Cost Record." In this section, space is allotted for the date the motor was attached to a machine and the

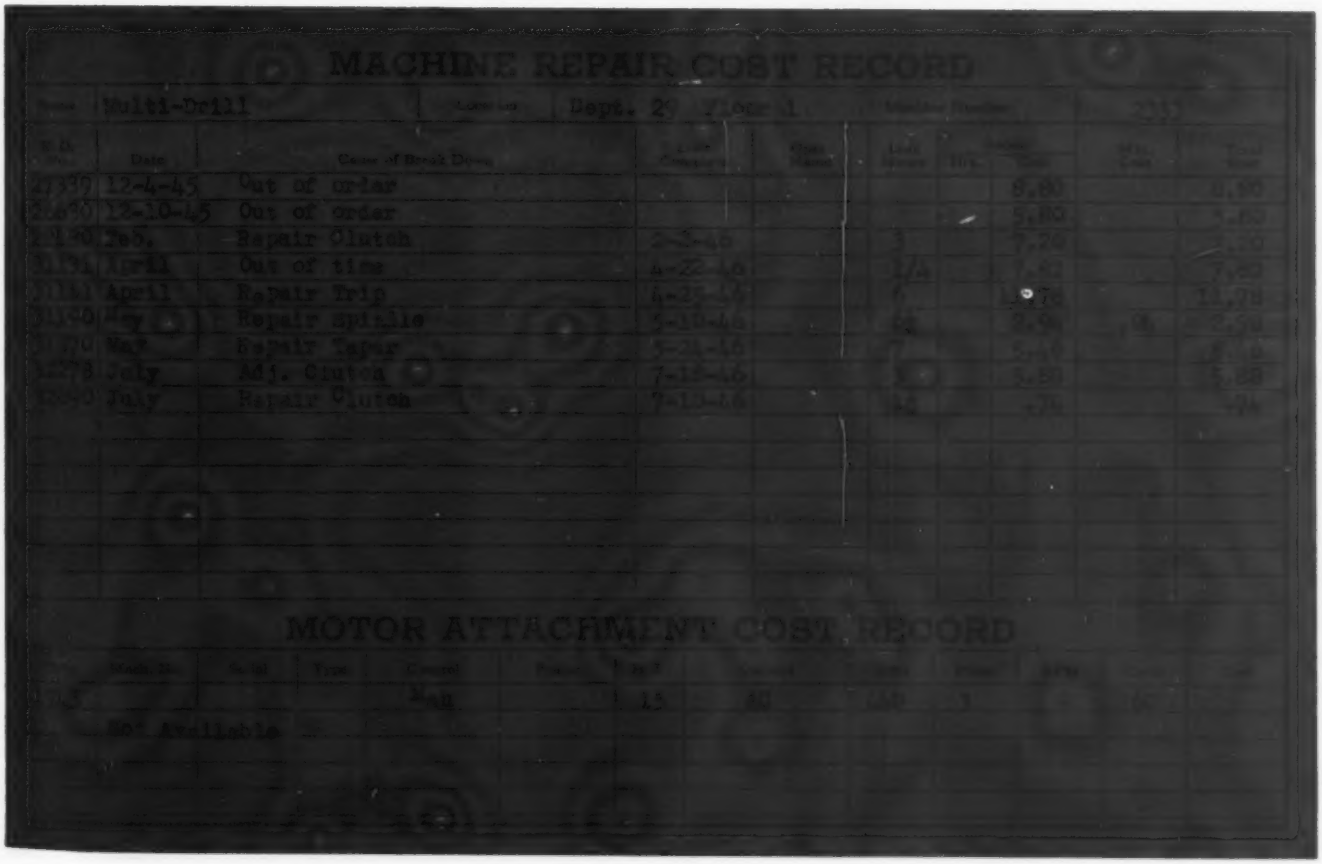
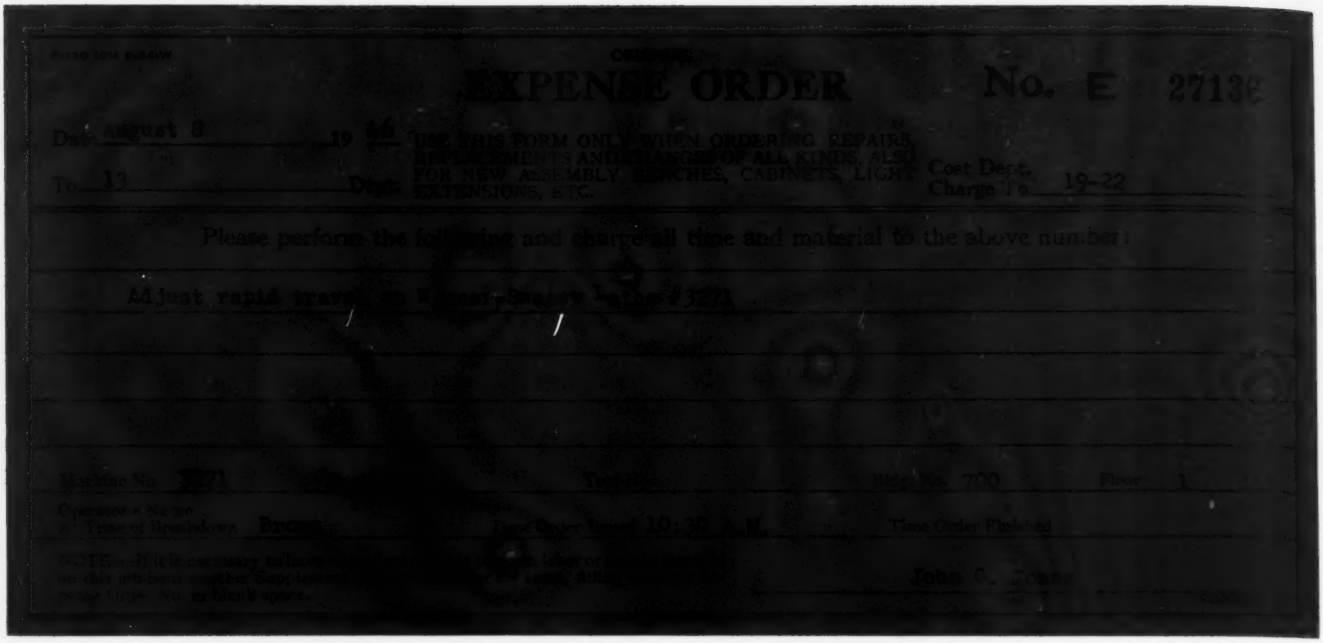


Fig. 2. This Repair Cost Record Gives the Plant Operating Personnel Data on Machine Maintenance Cost. Frequency of Repair is a Good Indication of the Operating Condition of Equipment


EXPENSE ORDER No. E 2713

Date August 8 19 46 USE THIS FORM ONLY WHEN ORDERING REPAIRS, REPLACEMENTS AND CHANGES OF ALL KINDS, ALSO FOR NEW ASSEMBLY BENCHES, CABINETS, LIGHT, POWER EXTENSIONS, ETC.

To 13 Dept. Cost Dept. Charge To 19-22

Please perform the following and charge all time and material to the above number:

Adjust rapid travel on Thread Grinder Lathe #3271

Machine No. 3271 Type Bldg. No. 200 Floor 1

Operator's Name

Time of Breakdown Promptly Time Card Turned In 10:30 A.M. Time Order Phoned

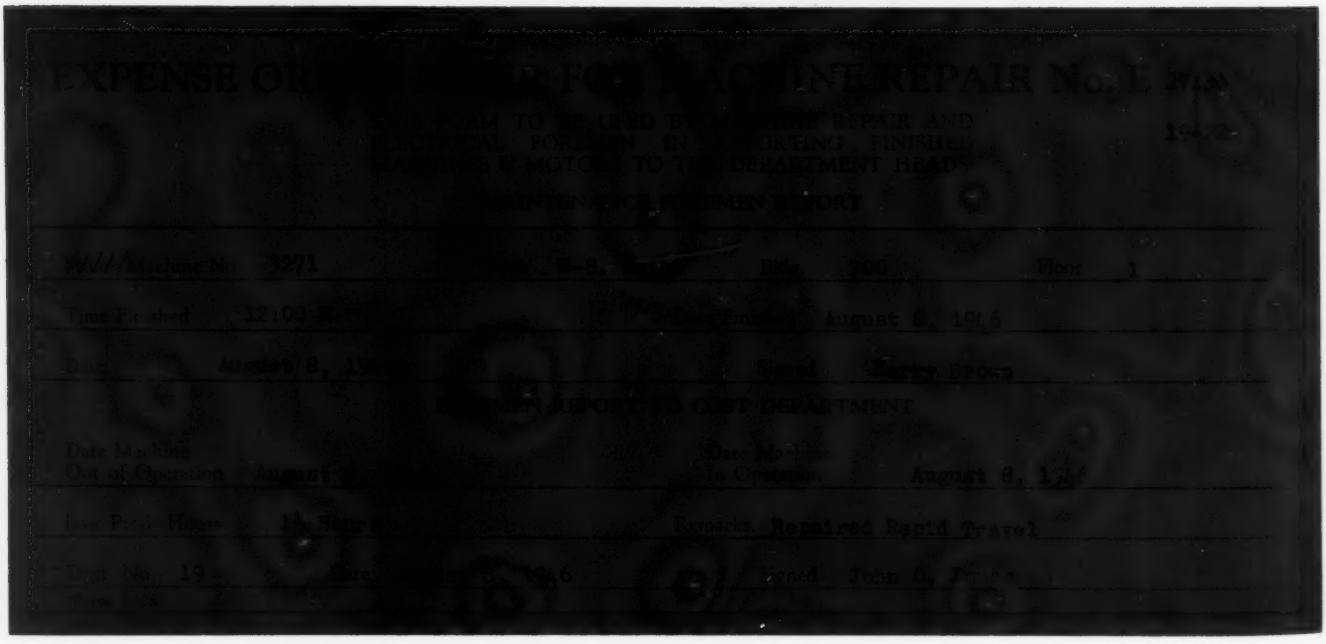
NOTE—If it is necessary to have any of this product supplied from stock, enter Stock Order No. in blank space. John C. Foley

Fig. 3. The Expense Order Form is a Requisition to the Maintenance Foreman for Repairs. Costs are Charged against the Number in the Upper Right-hand Corner

motor number, serial, type, control required, frame, horsepower, type of current on which it operates, voltage, phase, speed, frequency rating, and cost.

The expense order mentioned in connection with the machine repair cost record is a form made out in duplicate by a foreman or the master mechanic for the maintenance foreman (see Fig. 3). This gives the number of the machine or motor to be repaired, its location, name of operator at time of breakdown, and time the order was issued. Upon receipt of such an order, the maintenance supervisor has the proper authorization to proceed with the work. He also will charge the expense involved to the number of the expense order that appears in the upper right-hand corner.

An expense order rider, Fig. 4, is provided for the use of the maintenance and departmental foremen, and is employed in determining the amount of lost production hours resulting from each breakdown. This card is made in two sections. The upper half contains information to be filled in by the maintenance foreman, including the rider num-


EXPENSE ORDER FOR MACHINE REPAIR No. E 2713

Machine No. 3271 Type Bldg. 200 Floor 1

Time Finished 12:00 Noon Foreman August 8, 1946

Date August 8, 1946 Signed Harry Brown

REPORT TO COST DEPARTMENT

Date Machine Out of Operation August 8 Date Machine In Operation August 8, 1946

Lost Prod. Hours 2½ Hours Remarks Repaired Rapid Travel

Cost No. 19 Dept. 22 1946 Signed John C. Foley

Fig. 4. Maintenance and Departmental Foremen Use the Expense Order Rider to Determine the Amount of Lost Production Time Resulting from Each Breakdown

ber corresponding to the expense order number, the number of the machine or motor to be repaired, location, time finished, and other data.

After the machine has been repaired and is in operation again, the departmental foreman fills in the lower half of the expense order rider with such information as the date that the machine went out of operation, the date it was put back in operation, lost production hours, and other pertinent information, and mails the card to the cost department, where the data is posted on the master file.

Operation of the System

The cost department posts daily all expense orders and expense order rider information received on the master file. Once a month the cost department sends to the master mechanic's office a recapitulation of all machine repair expense incurred in the previous months, with the record broken down on a departmental basis into such categories as labor cost, material cost, total cost, lost production hours, etc.

Upon receipt of the repair cost data, the master mechanic posts the files and submits a monthly report to the general superintendent, who reviews it and takes such action as the report indicates is necessary.

Monthly, all labor, materials, and total repair costs are graphed by departments and for the entire plant, with the purpose of comparing the machine repair costs with the amount appropriated in the departmental and plant budgets. The cost of the actual operation of the system is relatively small in comparison to the results obtained, requiring only about eight hours of clerical labor per day.

Advantages of the Plan

It is obvious that much time is saved by the maintenance of these records, and that confusion is avoided by having a fixed routine and an accurate source of information. Moreover, production has been increased, as troublesome machines are quickly earmarked for major overhauling or replacement. Routine preventive inspections have helped materially in this respect. At the same time, the system provides an up-to-date machine inventory and "condition" inventory, which proves extremely valuable to management.

By having these features combined in one card, anyone concerned can obtain at once information pertaining to the machine in question. It can be seen at a glance whether the machine should be repaired or replaced. This point simplifies the preparation of plant machine tool budgets, and takes the guesswork out of this important planning function.

Profile-Forming Device for Surface Grinding Wheel

By F. S. MANN

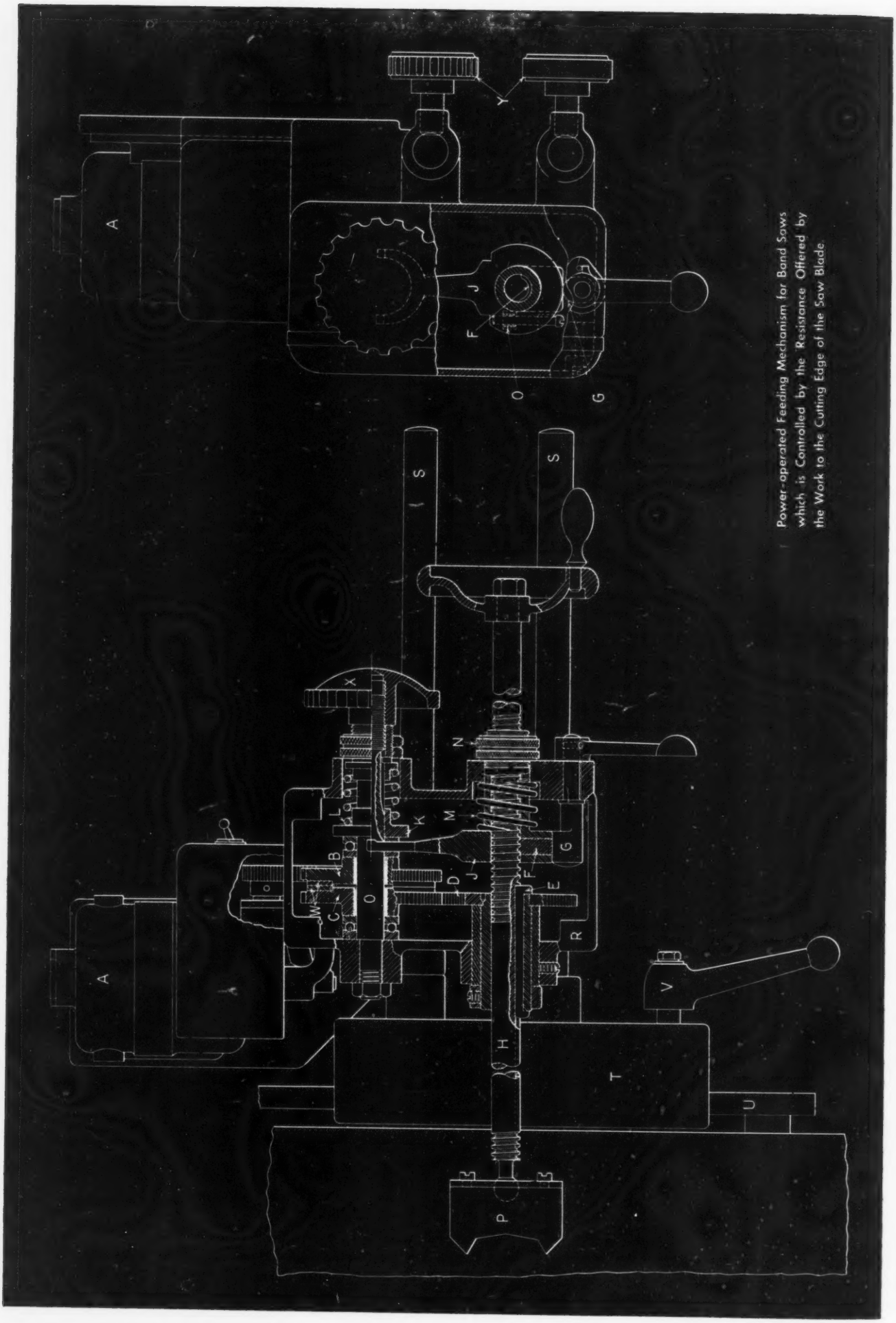
In surface-grinding an irregular-shaped piece, it often speeds up production if the form of the piece is cut directly on the grinding wheel. The device shown in the accompanying illustration, while not intended for surface grinding, can be modified by the addition of supporting legs to cut the templet form on the wheel.

Device for Profile-forming Surface Grinding Wheel

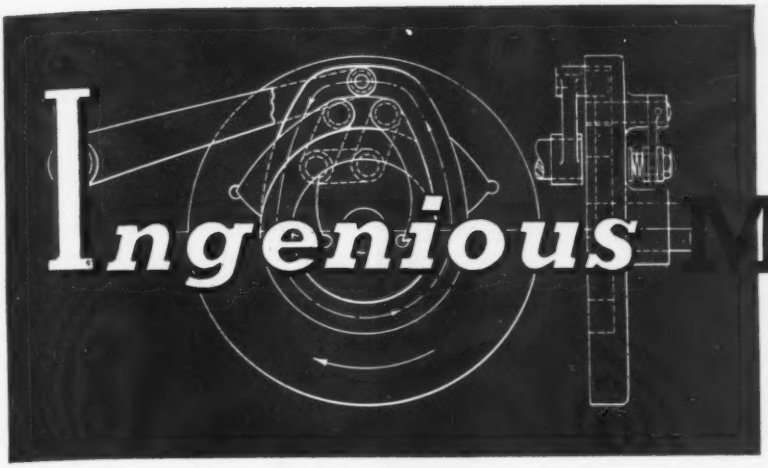
It consists simply of a diamond-tool holder *A*, mounted on a shaft with a tracing follower *S*. This follower, which must be the same thickness as the diamond *E* to insure an accurate pattern, is moved across the templet *B* by the knurled pin *D*, and thus reproduces the form of the templet on the grinding wheel. Both the toolpost and the actuating pin *D* are attached to carrier *F*. The carrier has two grooves in it that line up with grooves in the top and bottom cover plates. Steel balls, housed in the grooves, provide a ball-bearing surface on which the carrier *F* rides. Covers (not shown) are required to prevent the balls from falling out.

* * *

Temperatures as torrid as 6000 degrees F. have been recorded as electrons hit the target in X-ray tubes.



Power-operated Feeding Mechanism for Band Saws which is Controlled by the Resistance Offered by the Work to the Cutting Edge of the Saw Blade



Ingenious Mechanisms

Mechanisms Selected by Experienced Machine Designers as Typical Examples Applicable in the Construction of Automatic Machines and other Devices

Power Feeding Mechanism Controlled by Resistance to Band-Saw Blade

By WILLIAM F. OCENASEK
Chief Engineer and Technical Manager
Walker-Turner Co., Inc., Plainfield, N. J.

The patented power feeding mechanism here illustrated fulfills a long-felt need in the operation of metal-cutting band saws. Overloading of a band saw results in distortion and failure of the blade. However, a positive feeding device, such as this one, which is controlled by the resistance encountered at the cutting edge insures definite blade protection. While maintaining a preset feeding pressure, the driving clutch of this mechanism will slip upon increased resistance to the feed-screw.

Varying thicknesses of material can be cut without adjusting or changing the mechanism. Maximum loading of the blade is possible, with due regard to the characteristics and sharpness of the blade. Minimum cutting time for the hardness and thickness of the material being sawed is insured. The mechanism is adaptable to the feeding of regular or irregular shaped pieces, and functions evenly without vibration.

The feeding mechanism consists principally of a motor *A*, which drives a feed-screw *H* through suitable reduction gears *B*, *C*, and *D*, and a spring-loaded clutch. Gears *B* and *C* are faced with a bi-metal material *W* to form the frictional surfaces of the clutch. Gear *D* is secured to the feed-screw by the key *E*.

Clutch fork *J* is engaged with the feed-screw by half-nut *F* through the action of cam-lever *G*. When the cam-lever is in the "off" position, the half-nut is pushed out of engagement with the feed-screw by two small springs *O*. With the power feed thus disengaged, the feed-screw can be pushed by hand, forward or backward. The motor need not be stopped and restarted between cuts, as the cam-lever can be engaged or disengaged and the feed-screw stopped or reset at any point.

When the forward feeding motion of the feed-screw encounters resistance beyond the point established by the adjustment of spring *M*, the pressure of the spring is overcome and the clutch fork is driven in the opposite direction to the feed-screw motion. This causes the clutch fork to exert force against collar *K* and spring *L*, which reduces the friction between the clutch faces. The reduced friction permits increased slippage of the clutch members and thus reduces the forward motion of the feed-screw.

The position of thumb-nut *N* on the shank of clutch fork *J* controls the pressure of the feed. Hand-knob *X* increases or decreases the friction in the driving clutch by compressing or releasing spring *L*. This knob can be adjusted while the feeding mechanism is in operation.

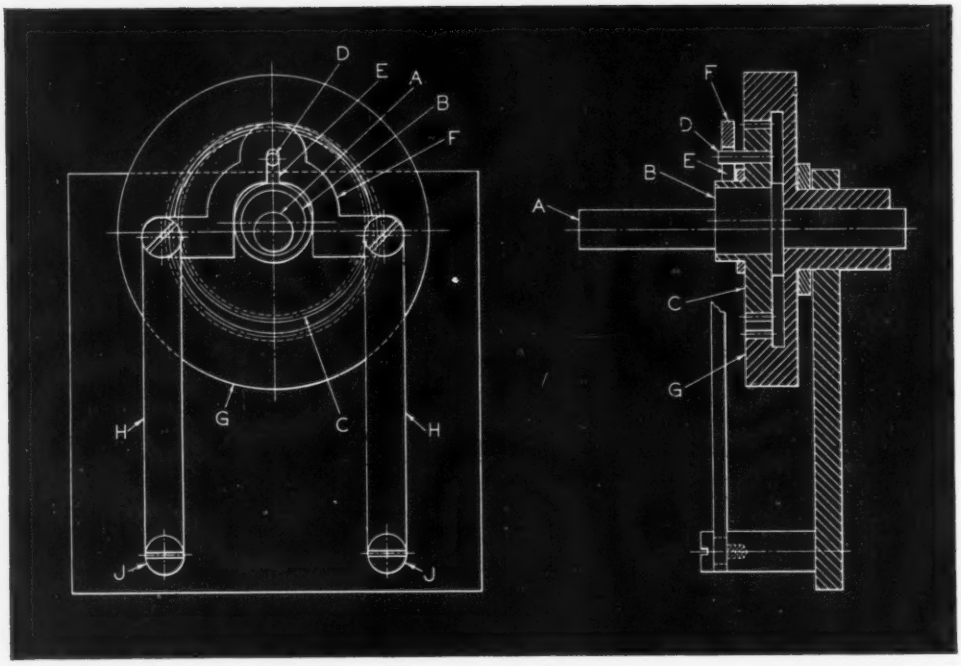
Housing *R* serves to retain the lubricant and protects the mechanism from dirt. Pusher-block *P*, which slides on the band-saw table, may be used to engage the work directly or a saw-tooth adapter may be interposed between it and the work when irregular shapes are encountered.

A guide strip *U*, which is fastened to one edge of the band-saw table (or is an integral part of it), supports bracket *T*. Lever *V* operates a lock-screw that clamps the bracket to the guide. The two rails *S* are supported by bracket *T* and permit lateral adjustment of the feeding mechanism with respect to the cutting tool through clamping wheels *Y*.

Two-Gear Speed-Reduction Mechanism Redesigned to Obtain Uniform Rotation

By GEORGE W. NEWTON

The illustration on page 196 shows how the speed-reducing mechanism of two-gear type illustrated and described in Volume I of MACHINERY'S book "Ingenious Mechanisms for Designers and



Two-gear Speed Reduction Mechanism Redesigned to Cause Pinion C on Driving Shaft A to Drive Internal Gear G at Uniform Speed and at a Gear-reduction Ratio of 12 to 1

Inventors," pages 340-342, was redesigned to obtain uniform rotation. A standard internal gear *G* and pinion *C* were modified to operate without tooth interference in this redesigned mechanism.

On the driving shaft *A* is mounted an eccentric *B*. The axis of driving gear *C* follows the motion of eccentric *B*, but is kept from rotating about its own axis by pin *D*, which works in the slot *E*. Linkage *F* is actuated by the eccentric *B*, which constantly maintains slot *E* in a perpendicular position through the action of the parallel links *H*, pivoted on studs *J*. Since the axis of gear *C* follows the motion of eccentric *B* and the gear does not rotate about its own axis, the motion imparted to the driven gear *G* will be uniform and equal to (R.P.M. of *A*) $\times \left(\frac{N-n}{N}\right)$, in which *N* equals the number of teeth in gear *G* and *n* equals the number of teeth in gear *C*.

* * *

Light Pressure on Tungsten Carbide Increases Life of Diamond Lapping Wheels

Diamond-impregnated lapping wheels effectively resist wear and breakdown and are little affected over long periods of use when correctly applied. This was proved by tests carried out in England by A. C. Wickman, Ltd., on Spedia lapping wheels.

It was emphasized that the full cutting action of the wheel is obtained, when lapping tungsten carbide, by applying the wheel with a light pressure. This is contrary to the accepted practice in lapping other cutting metals. However, in this case, heavy pressure not only shortens the life of the diamond-charged wheel, but is also likely to affect the qualities of the tungsten carbide being lapped.

The test was made with a standard 5-inch diameter cup-wheel having a 1/2-inch diamond-impregnated lapping face. It was mounted in a horizontal plane on a turntable. A solid piece of sintered tungsten carbide, 1/2 inch in diameter by 6 inches long, was placed in vertical contact with the lapping face of the wheel. A 5-pound weight provided pressure on the end of the tungsten-carbide rod. The wheel was rotated at a speed of 5000 feet per minute, and light machine oil was applied by a pad. The test was continued until 15 inches of carbide had been lapped away. There was no measurable wear of the wheel.

* * *

Silicone Paint Developed for Lifetime Finishes

A new silicone paint that is expected to provide lifetime finishes for automobiles, refrigerators, electric ranges, and hospital equipment is being developed by the chemical department of the General Electric Co. It is believed that this paint will retain its original color and gloss indefinitely, and that brighter and clearer colors will be obtainable than heretofore. Tests have shown that this silicone product is highly resistant to severe weather conditions, chemicals, and heat.

* * *

In a recent issue of *Trundle Talks*, published by the Trundle Engineering Co., Cleveland, Ohio, Mr. George T. Trundle, Jr., says that he wonders how a union, considering a decision as to whether or not it should call a strike, would feel if a corporation treasurer walked in some nice morning and asked to see the books of the union.

Shop Equipment News

Fig. 2

Machine Tools, Unit Mechanisms, Machine Parts, and Material-Handling Appliances Recently Placed on the Market

Moore "Panto-Crush" Wheel-Dresser

Both pantographic diamond form-wheel dressing and roll-crushing can be performed on the "Panto-Crush" wheel-dresser developed by the Moore Special Tool Co., Inc., 734 Union Ave., Bridgeport 7, Conn. This new two-in-one dresser, shown in Fig. 1, consists of a high-precision pantograph, working directly from a templet, plus a power-driven roll-crusher. The two units are mounted together and are always accurately positioned with relation to the spindle. This combination of equipment is designed to provide a higher degree of precision and economy in form-grinding than is obtained by using either method alone or by employing independent units for the application of both methods.

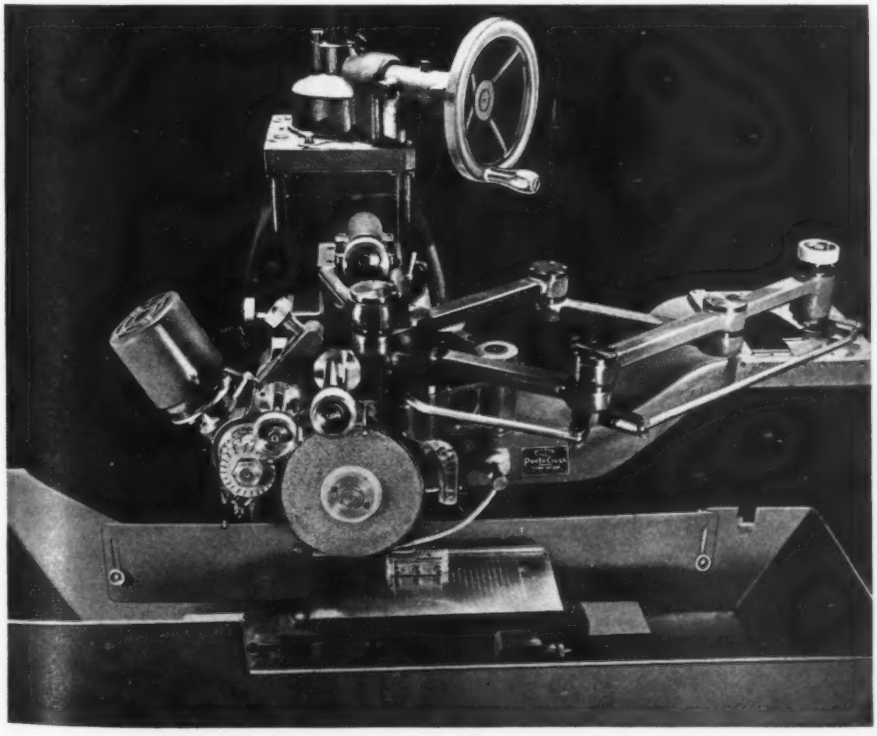


Fig. 1. Moore "Panto-Crush" Wheel-dresser which Combines Roll-crushing and Diamond-dressing in a Single Device

The principles of design embodied in this dresser can be employed, within reasonable limits, on any type of grinder, either cylindrical or surface, for the production of a wide variety of circular or linear form-ground work, such as shown in Fig. 2. Either of the wheel-dressing methods or both methods can be employed to suit the particular job to be done, roll-crushing being used for fast, cool grinding, and diamond dressing for fidelity of form and fine finish. The operator can readily switch from one method to the other without disturbing the work setting or the location of either truing device. It is not necessary to raise or lower the wheel-spindle for dressing the wheel, yet the wheel-spindle can be raised or lowered without losing the setting or affecting the relative positioning of the wheel form to the dressing device.

The Panto-Crush wheel-dresser need not be removed from the surface grinder to permit conventional surface grinding. No setting up or removing of complex attachments is required for dressing the wheel. The Moore pantograph principle has been developed to permit generating irregular forms, such as involute curves, or combinations of irregular curves and straight lines which are difficult or impossible to generate with conventional dressers. With this equipment, the only work performed in generating the wheel form which requires skill is that required in making the form templet. Once

To obtain additional information on equipment described on this page, see lower part of page 222.

the templet is made, the precise wheel form can be easily duplicated as often as desired.

The combination of roll-crushing and diamond-dressing is said to reduce diamond wear, because by this method the crush type dresser is employed for the major part of the grinding, the diamond being used only to dress the wheel for grinding the crusher roll and for finish-grinding the work. The pantograph has a 10-to-1 ratio between the accurately interrelated follower or stylus and the diamond tool. The diamond is automatically centralized in a carbide bushing, and the hardened and ground stylus is located on pins in jig-ground holes.

Maximum width or depth of contour capacity is determined by practical grinding limits rather than by the size of the device. Contours 7/8 inch wide can be formed without extending the templet beyond the table. The stylus and diamond arms, in addition to conventional pantograph movements, are capable of coordinated angular rotation. This permits the dressing of forms otherwise difficult to handle, by changing the angle of approach of the diamond to the wheel. It also permits the grinding of forms which are similar to, but larger or smaller than, the original by using the same templet. The angular articulation of the diamond tool and stylus arm also serves to reduce wear on the diamond.

The crusher roll is ground in place by the diamond-dressed wheel from the original templet and used in the same spindle without disturbing the setting. The diamond can be fed into the wheel, either radially or axially, by movements of the main pivot mounted on horizontal and right-angled hardened and ground dovetail slides. Dial graduations indicate the amounts of in-feed, permitting the operator to drop or lower the wheel spindle an amount equal to that removed from the wheel by dressing.

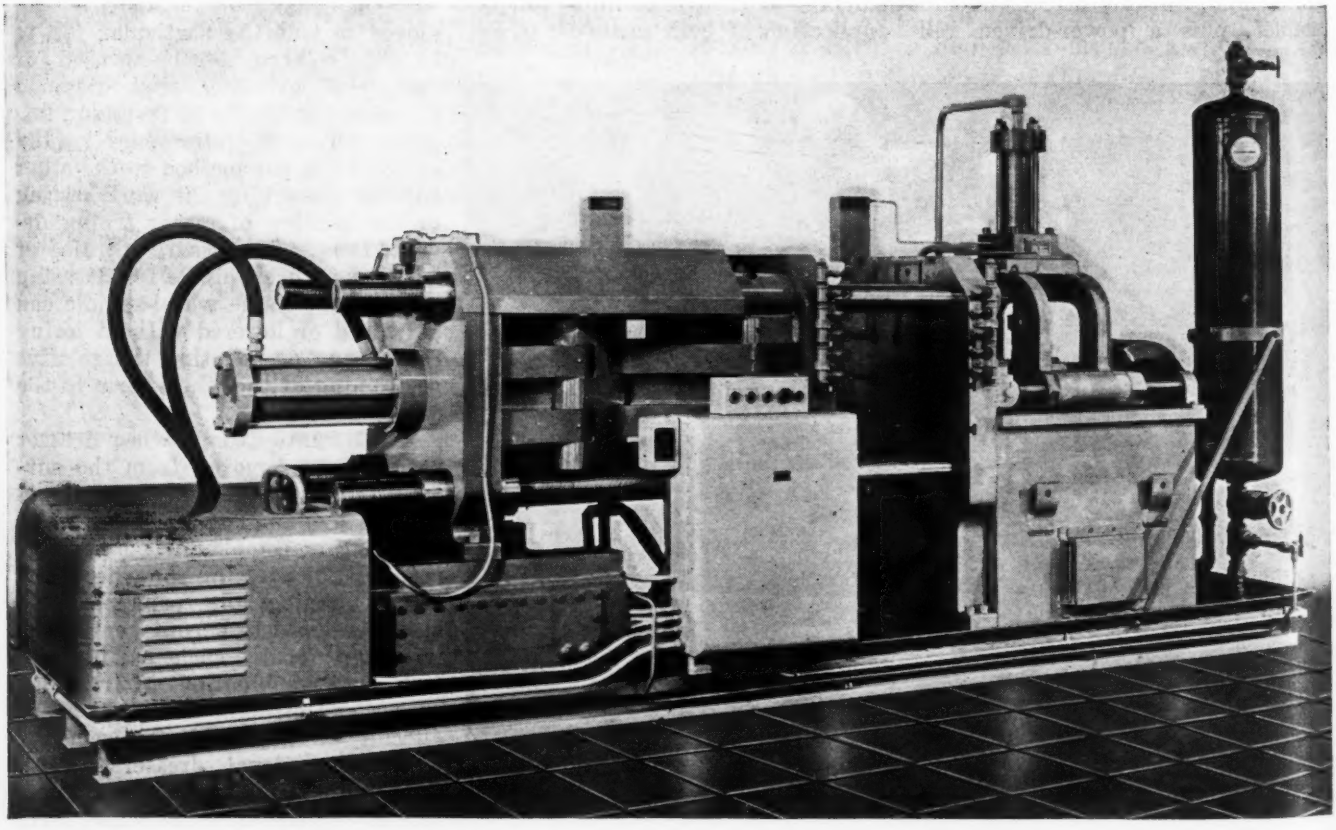
The power-driven crusher roll drives the wheel-spindle by friction, anti-friction bearing spindles being used to assure easy rotation and axial and radial rigidity. The crusher roll can be reground as often as necessary to maintain the true form on its periphery.

The crusher is fed into the wheel by means of an eccentric cam rotated by hand. Further fine in-feed is provided by an easily accessible thumb-screw. Axial movement is measured on a graduated barrel on the lead-screw. Graduations correspond to those controlling the axial feed of the pantograph. Since the pantograph has a 10-to-1 ratio the main pivot must move one-ninth farther than the desired movement of the diamond. Automatic compensation for this difference is achieved by providing a 9-pitch lead-screw for the pantograph control and a 10-pitch screw for the crusher. Each dial has 100 divisions and reads directly to thousandths of an inch, in terms of movement of the diamond or crusher. 61

"Hy-Mac" Die-Casting Machine

Hydraulic Machinery Inc., Die-Casting Machinery Division, 12825 Ford Road, Dearborn, Mich., has developed a Model M-114 "Hy-Mac" pressure die-casting machine designed for the production of zinc-, aluminum-, and brass-alloy die-castings. This machine is equipped for full hydraulic operation, and is furnished with a 7 1/2-H.P. motor, ready for installation and operation. All operating levers and valve control mechanisms are placed within easy reach of the machine operator.

Outstanding features include a simplified arrangement which per-



Hydraulic Self-contained "Hy-Mac" Pressure Die-casting Machine

To obtain additional information on equipment described on this page, see lower part of page 222.

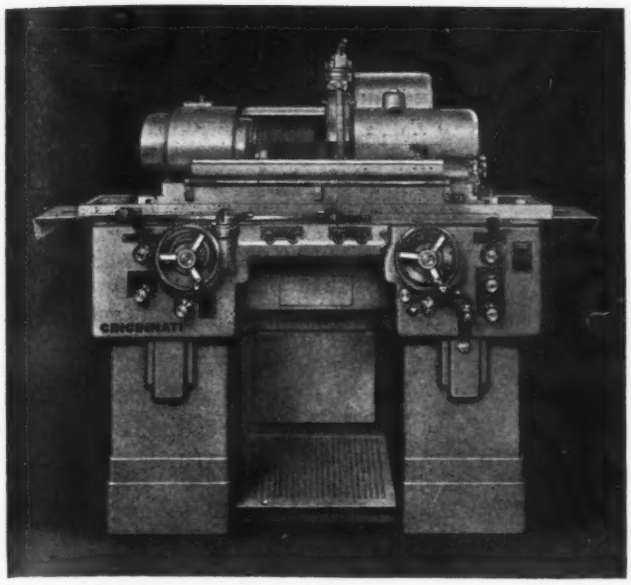


Fig. 1. Plain Hydraulic Grinding Machine Built by Cincinnati Grinders Incorporated

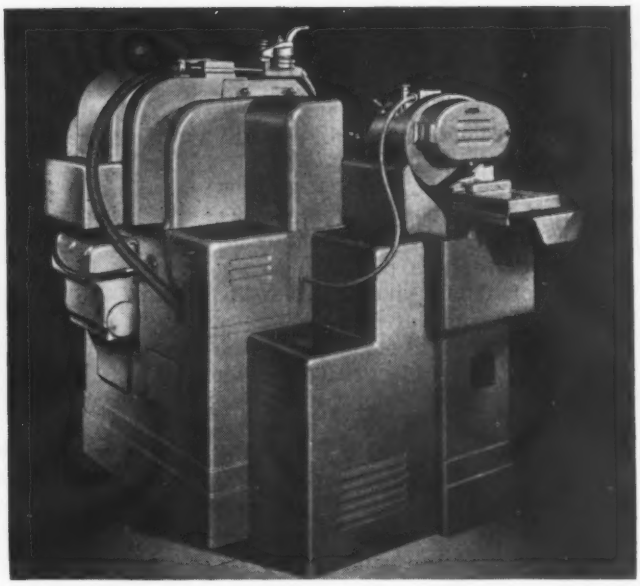


Fig. 2. Rear View of Cincinnati Grinding Machine Illustrated in Fig. 1

mits the plunger to be installed in a few minutes; an improved gooseneck designed for economical, long-life operation; and an arrangement whereby installation of a new pot and gooseneck can be accomplished within a half hour. The furnace is especially designed and insulated to keep fuel costs at a minimum. Oil, electric, and other lines are enclosed, but readily accessible. A deoxidizer designed to reduce dross to a minimum is standard equipment for the zinc-alloy casting machine. A complete unit with cold chamber into which the molten metal is ladled is available for high-pressure casting of aluminum and brass alloys. The machine is so constructed that the hot or furnace end can be interchanged for either zinc- or aluminum- and brass-alloy production equipment. The welded "automobile frame" type construction of this machine is said to maintain accurate alignment of the dies at all times.

The die plates have a capacity of 20 by 20 inches between bars. The die opening is 10 inches, and the die space ranges from a maximum of 28 to a minimum of 12 inches. Pressures up to 6000 pounds per square inch are available for die-casting zinc, and up to 16,000 pounds per square inch for aluminum and brass. An oil operating pressure of 1000 pounds is employed, and the dies are locked under a pressure of 400 tons. The melting pot has a capacity of 500 pounds for zinc and brass, and 200 pounds for aluminum. The machine occupies a floor space of 54 by 180 inches, and weighs 16,000 pounds. 62

Cincinnati Hydraulic Grinding Machine

A "Filmatic" plain hydraulic grinding machine designed for precise center-type grinding operations on small-diameter work is being built by Cincinnati Grinders, Inc., Cincinnati 9, Ohio. This machine has many new features developed to simplify and speed up production on work that is required to be held to extremely close limits of accuracy and finish. It can be provided with hand or automatic hydraulic mechanisms for handling high-production work by either the traverse or in-feed method of operation, and is available in 4- by 12-inch and 4- by 18-inch sizes.

The table ways of this machine are automatically lubricated with filtered oil under pressure, and are designed with large surfaces to assure low unit bearing pressure. The two-speed hand traverse of the table permits rapid positioning for set-up purposes or slow hand adjustment for shoulder grinding. Power table traverse is hydraulically actuated at infinitely variable rates from 3 to 280 inches per minute. An independent truing traverse rate of 3 inches per minute permits the grinding wheel to be trued without disturbing the traverse rate setting. A single lever starts the power table traverse and simultaneously starts the headstock rotation and coolant flow.

The direction of table motion is controlled by a two-position reverse lever, which can be operated by hand or adjustable trip-dogs. The dog-operated table reverse is accurate to 0.001 inch, and permits reciprocation with a stroke as short as 1/16 inch, which, in conjunction with the automatic pick-feed mechanism, can be used to simulate in-feed grinding on short work. The table can also be made to dwell from 0 to 5 seconds at each reversal. The footstocks of standard machines are provided with combination lever and screw type spindle retraction control.

Three alternating-current motors provide a range of work speeds from 150 to 1000 R.P.M. When equipped with a direct-current motor, the three-step pulley and rheostat control provide stepless speed adjustments throughout a range of 175 to 800 R.P.M.

The grinding-wheel spindle is mounted in "Filmatic" bearings arranged to assure extremely accurate "dead center" rotation of the spindle. These bearings are self-adjusting for load variations, and thus permit heavy stock removal or fine finishes to be attained with equal ease.

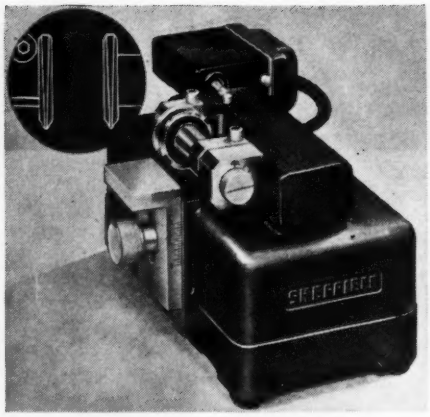
A built-in positive stop is provided to limit the in-feed rotation of the handwheel for accurate sizing on repetitive cuts. A pick-feed mechanism provides automatic in-feed of the grinding wheel at each reversal of the table when traverse grinding, the amount of feed being controlled by a dial graduated to 0.0005 inch. Plunge-cut jobs on large production schedules can best be performed with a completely automatic in-feed cycle provided by the addition of the automatic in-feed attachment. 63

To obtain additional information on equipment described on this page, see lower part of page 222.

Sheffield Production Thread Gage

A production "Leadchek," which has been developed by the Sheffield Corporation, Dayton, Ohio, has adjustable truncated cylindrical gaging anvils that make possible the checking of thread lead within a range of 4 1/2 to 60 threads per inch to an accuracy of 0.0001 inch. This instrument accommodates a wide diametrical range of thread work parts, and is said to provide great ease of initial set-up and change-over, as well as rapid, precise measurement of the lead.

It is available with either of two types of gaging heads—a "tenth" dial indicator for lead tolerances within the indicator range; and an "Electrigage" for more accurate gaging, where lead tolerances are as close as 0.0001 inch. The "Electrigage," an electrical gaging head developed jointly by Westinghouse and Sheffield, is being used on a number of Sheffield instruments. The adjustable truncated cylindrical gaging anvil can be moved and locked in place at any point within a range of 0.200 inch to 2.000 inches. Both gaging anvils are adjustable for the desired pitch by rotating on their mounting shafts. Calibrations are on the mounting blocks. 64



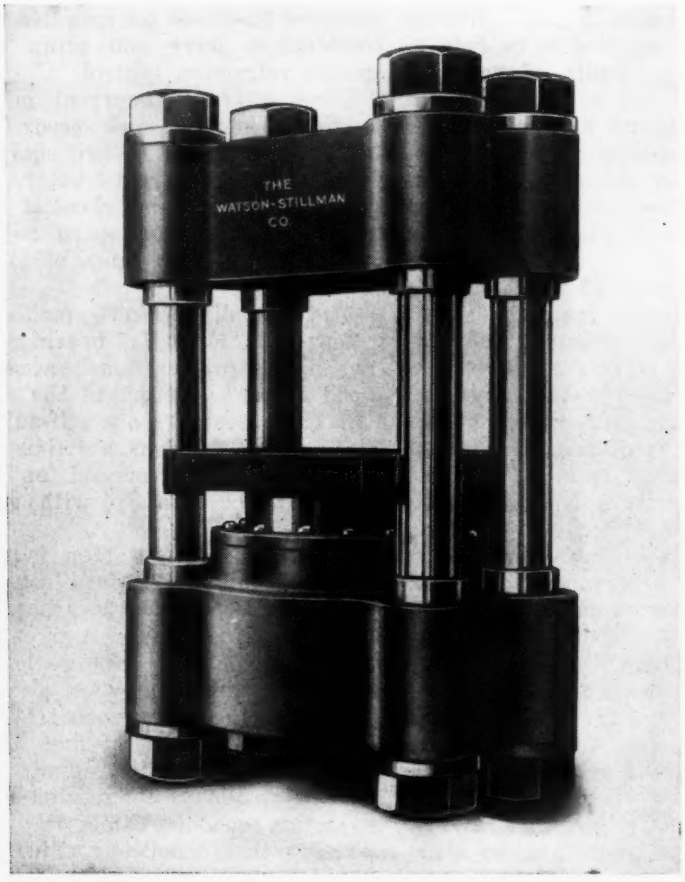
"Leadchek," with Insert Showing Tapered Truncation that Permits Gaging Various Pitches without Changing Anvils

Watson-Stillman 500-Ton Hobbing Press

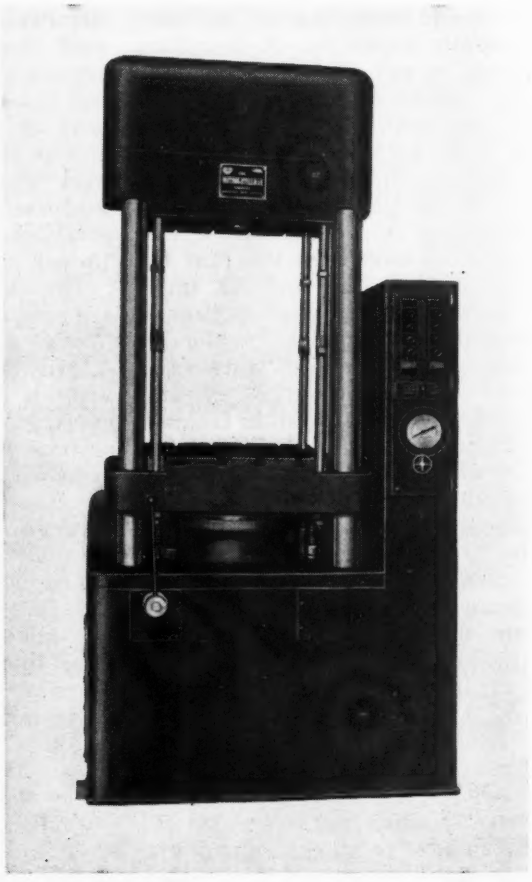
A 500-ton hydraulic hobbing and die-sinking press designed for heavy-duty precision work has recently been added to the line of presses built by the Watson-Stillman Co., Roselle, N. J., which have capacities ranging from 200 to 3000 tons. The platens of the new press are machined to a smooth finish from open-hearth steel castings, and are accurately bored to fit the ground and polished columns made from steel forgings. The smooth-bored cylinders are of open-hearth steel, and the rams are ground and polished close-grained iron castings. 65

Watson-Stillman Semi-Automatic Molding Machine

A 100-ton semi-automatic molding machine has recently been added to the line of plastic molding equipment manufactured by the Watson-Stillman Co., Roselle, N. J. The new machine is suitable for either compression or transfer molding. Degassing control by time rather than limit switches is a feature of this machine, which allows a complete range of die openings and facilitates adjustment. The press is arranged to permit the attachment of a top transfer cylinder, which is optional equipment. This cylinder, with the



Watson-Stillman Hydraulic Hobbing and Die-sinking Press



Watson-Stillman Semi-automatic Plastic Molding Machine

To obtain additional information on equipment described on this page, see lower part of page 222.

addition of a plate to connect the ram to the ejector bars, can also be used as a top hydraulic ejector cylinder.

The die space is 20 by 21 inches, the stroke 12 inches, and the operating pressure 2200 pounds per square inch. The operating speeds of the machine are: Advance, 260 inches per minute; pressing, 13.5 inches per minute; and return, 220 inches per minute. The capacity of the top cylinder is 25 tons. The machine is driven by a 5-H.P. motor. The power unit can be steplessly adjusted to apply to within 25 per cent of the tonnage capacity of the press.....66

Electronic Snap Gage Made by the Yankee Precision Products Co.

Electronic Snap Gage for Production Inspection

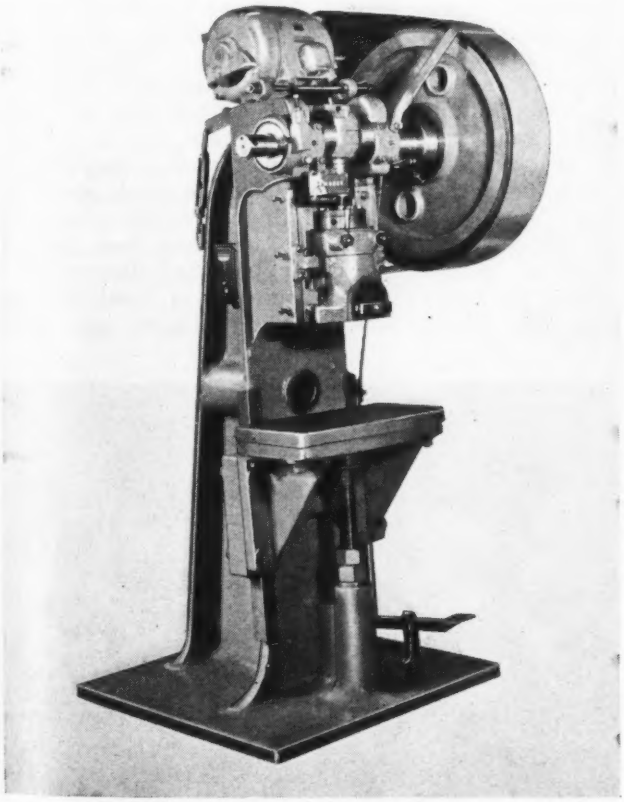
A new electronic snap gage for production inspection has been added to the line of the Yankee Precision Products Co., Hartford 6, Conn. The electronic gage-head is mounted on a snap-gage frame. For convenience in inspection of small parts, the unit can be mounted on a stand; a locking arrangement on the stand allows the gage to be set in any vertical position. Provision has been made for mounting an indicator on top of the frame in cases where readings are desired. Sizes up to 3 inches are standard, but larger sizes can be furnished. The gage operates on 110-volt, 60-cycle, single-phase current. 67

Walsh Horn Type Press

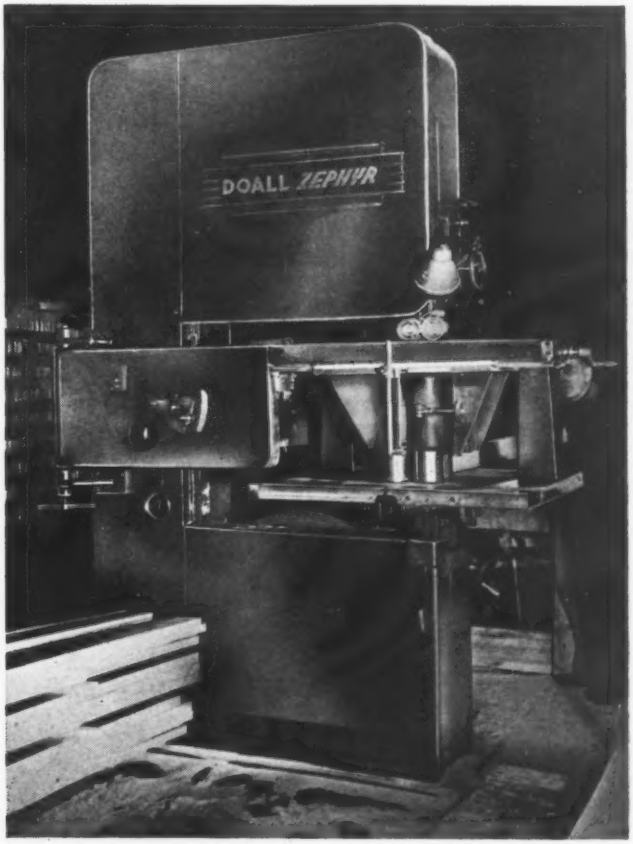
A new streamline model of the Walsh No. 3 horn type press has been brought out by the Walsh Press & Die Division of the American Machine & Gage Co., 4743 W. Kinzie St., Chicago, Ill. Important safety factors have been introduced in this press by mounting the motor on top of the press, which eliminates the jutting platform at the rear and locates the motor well above the workers. This arrangement also permits the press to be placed closer to the wall or other machines, thus effecting a saving on floor space. Additional safety is provided by a shield, which completely protects employes from the motor, V-belt, driving belt, and flywheel. The switch box is mounted on the main frame, within easy reach of the operator. A large circular clamp is provided to assure positive clamping of the die shank on the slide or ram. 68

DoAll "Resaw" Attachment

A "Resaw" attachment for use on the Zephyr Model 36 band saw is a new product of the DoAll Co., 1301 Washington Ave. S., Minneapolis 4, Minn. This new attachment can be bolted directly to the column of the band saw, and when not needed can be swiveled out of the way to permit use of the saw for scroll work and other applications. The attachment is heavily constructed to provide pos-



Horn Type Press Built by the Walsh Press & Die Division, American Machine & Gage Co.

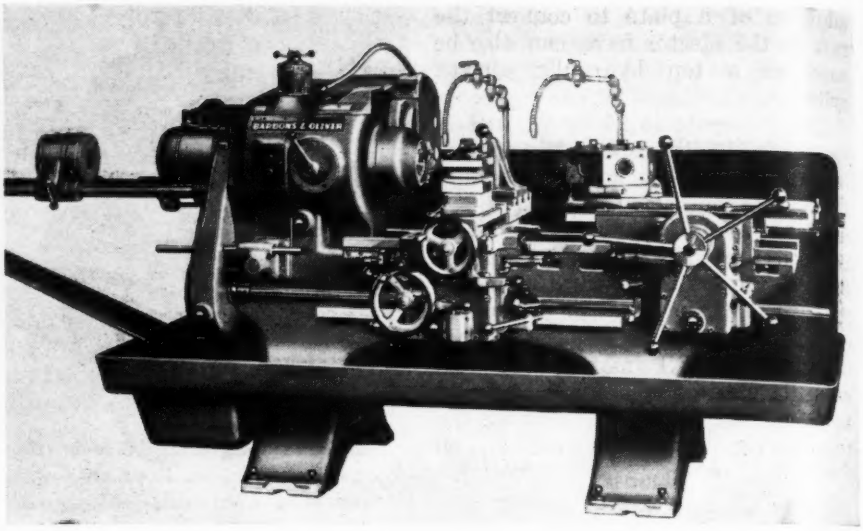


"Resaw" Attachment Designed for Use on Zephyr Band Saw Built by the DoAll Co.

To obtain additional information on equipment described on this page, see lower part of page 222.

itive feed and vibration dampening. An outstanding feature is the variable-speed drive, which gives the operator complete control over the rate of feed through a range of from 0 to 30 feet per minute.

The use of this resaw with thin saw blades is said to accomplish considerable savings in material. The accuracy of the attachment is such that the variation from absolute squareness when taking cuts to the full capacity of the machine is less than 0.002 inch. The runout is also less than 0.002 inch. The resaw will take material up to 12 by 12 inches, and is electrically driven. Idler rolls are kept in position against the work by strong spring tension. Indexing of the cut is controlled by a calibrated wheel. 69



Bardons & Oliver Ram Type Universal Turret Lathe Equipped with Hydraulically Operated Collet Chuck and Bar Feed

Bardons & Oliver Hydraulic Collet Chuck and Bar Feed

Bardons & Oliver, Inc., 1133 W. Ninth St., Cleveland 13, Ohio, have recently designed a hydraulically operated collet chuck and bar feed for their No. 7 ram type universal turret lathe. The increased work-gripping power provided by the new chuck makes possible the use of coarser feeds and heavier cuts. At the same time, the ease with which the hydraulic control can be manipulated minimizes operator fatigue. A geared pump in the machine head supplies oil under pressure for operating the collet chuck and for feeding the bar stock forward.

A new mechanism used in connection with the feed-finger holder permits easy, sensitive adjustment of the collet chuck for variations in stock dimensions. A five-position control valve with the piston balanced for easy operation provides for opening the collet, feeding the bar stock, and closing the collet. Spring-actuated detents make it possible for the operator to identify the various lever positions while watching the work. 70

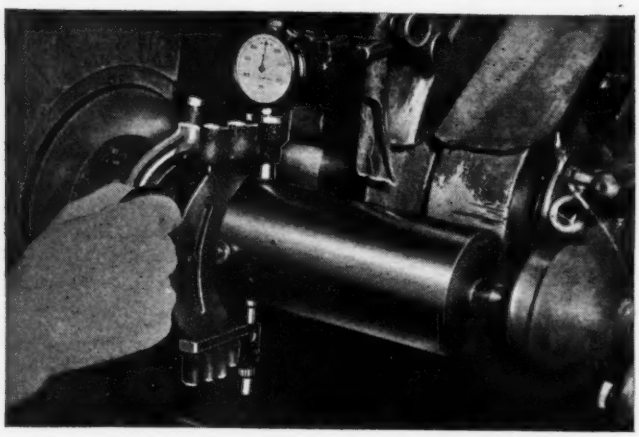
"Decimatic" Dial Snap Gage

Demountable heads and extension spacers are features of a new "Decimatic" dial snap gage made by the Standard Gage Co., Inc., Poughkeepsie, N. Y. A single pair of heads and four extension spacers cover a range of 4 inches, the gage being adjustable over a range of 1 inch with each extension spacer. Sets comprising a complete gage and three extra spacers are available which cover a range of 0 to 4 inches or 4 to 8 inches.

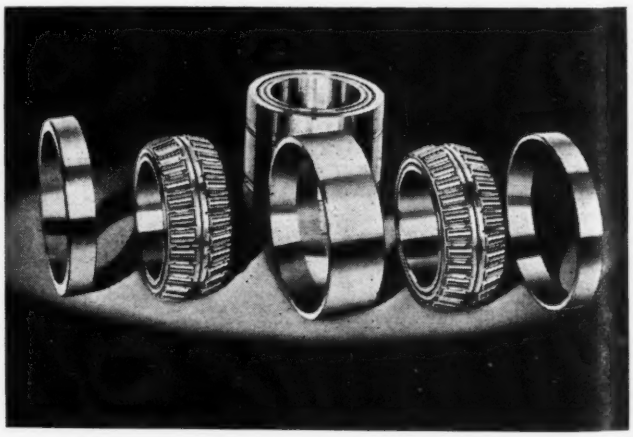
Both gaging pins are surfaced with cemented carbide to reduce wear, the lower adjustable pin being flat, while the upper one, which actuates the indicator, has a spherical surface. The gage can be quickly passed over the work, the size being obtained by noting the reading of the indicator hand at the point of maximum deflection. 71

Nickel-Steel Roller Bearings

Nickel-steel roller bearings for heavy-duty use in rolling mills, paper mills, and other industries are being placed on the market by the Kaydon Engineering Corporation, Muskegon, Mich. These bearings, made of steel having a nickel content of 3.75 to 4.25 per cent and a chromium content of 1.5 per cent, and carburized with a deep case, are highly resistant to shock, and can be made in thinner cross-sections than bearings of ordinary steel. The four-row taper bearings illustrated are used principally in steel and nonferrous rolling mills on backing rolls



"Decimatic" Dial Snap Gage Produced by the Standard Gage Co.



Nickel-steel Taper Roller Bearing Made by the Kaydon Engineering Corporation

To obtain additional information on equipment described on this page, see lower part of page 222.

and working rolls. Other bearings of the straight roller type and two-row taper type are also being made of high-nickel steel. 72

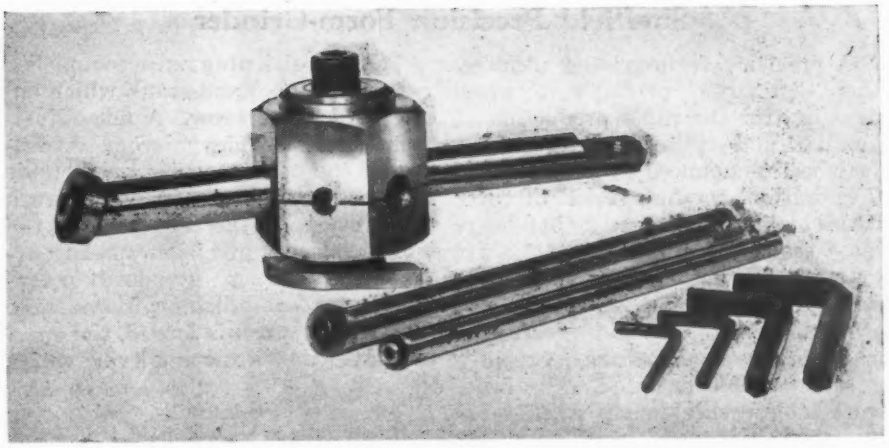
All-Position Welding Electrode

An all-position electrode—the Airco No. 87—has been made available by the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y., for welding mild steel and for joining sections where the fit is poor or the work is dirty. It is capable of operating on direct-current straight or reverse polarity, or on alternating current. The new electrode conforms to the American Welding Society Classification E-6012, and is marked in accordance with National Electrical Manufacturers' Association standards. It is said to have a very high deposition rate. 73

"Shearcutter" Boring, Turning, and Facing Tool

The Fearless Tool Co., 1234 S. Gramercy Place, Los Angeles 6, Calif., has announced a boring, turning, and facing tool of radically new design called the "Shearcutter," and a precision holder for use with the new cutter. These tools are designed for use on lathes, screw machines, drill presses, and boring machines.

An outstanding feature of the tool is the circular cutter bit, which is fastened securely to the end of the specially designed holder. The penetration angle of this cutter is such that a shearing cut is attained which results in a knife-like action. This cutting action is said to produce a mirror-like finish and to greatly reduce the frictional heat developed in cutting the metal.



"Shearcutter" Boring, Turning, and Facing Tools and Holders

By simply rotating the bit to a new position whenever the edge in use becomes dull, from twenty to fifty sharp cutting edges can be successively presented to the work. When the entire peripheral cutting edge becomes dull, the circular bit can be easily removed and quickly resharpened. 74

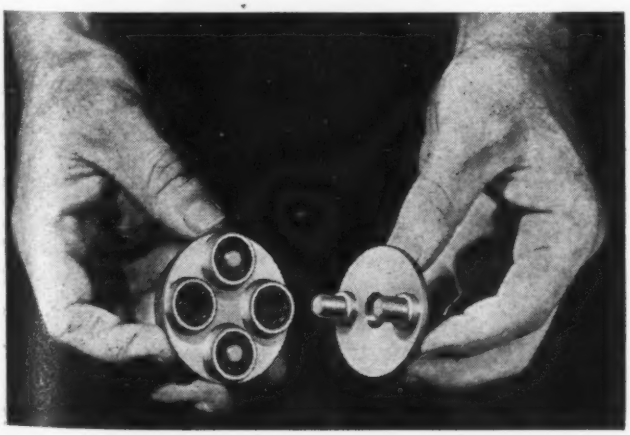
Morse Flexible Couplings for Small Motor Drives

"Morflex" couplings for fractional-horsepower drives are recent additions to the line of power transmission equipment manufactured by the Morse Chain Co., Detroit 8, Mich. These couplings are of flexible Neoprene "biscuit" construction, which shields machine installations from shock and permits slight angular misalignment of shafts. They are available in 3 and 9 foot-pound torque capacities, with weights of 1/2 pound and 1 1/4 pounds, respectively. The maximum speed is 3600 R.P.M. for both sizes. The bores range from 1/4 inch on the smaller size to 1 inch on the larger size. These couplings are unaffected by oil, dirt, or exposure to weather, and require no lubrication. 75

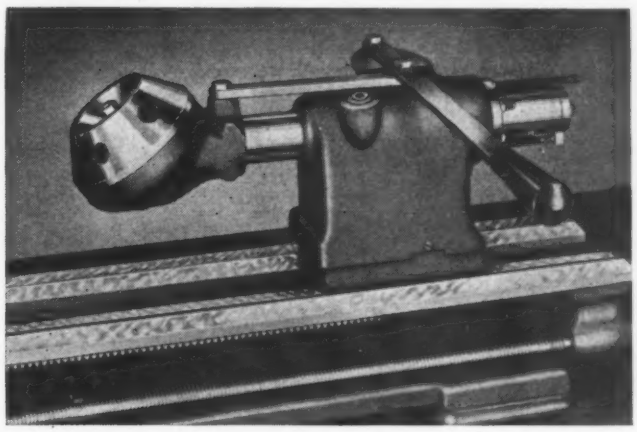
Hand-Lever Turret for South Bend Lathes

A new tailstock type hand-lever turret designed to be used on 9-inch South Bend lathes for jobs requiring a number of successive operations has been brought out by the South Bend Lathe Works, 383 E. Madison St., South Bend 22, Ind. This turret is mounted on the inside way of the lathe bed in place of the tailstock. The six-station turret head accommodates tools with 5/8-inch diameter shanks.

The length of cut taken at each station is regulated by means of an adjustable set-screw. The stop mechanism is geared to operate automatically in unison with the indexing of the turret-head. The index lock releases automatically at the end of the return stroke of the turret-slide, and indexing is performed by hand. Operations can be repeated or skipped at will. 76



"Morflex" Coupling for Small Motor Drives



South Bend Tailstock Type Hand-lever Turret

To obtain additional information on equipment described on this page, see lower part of page 222.

Sheffield Precision Form-Grinder

A precision form-grinder utilizing the "Crushtrue" principle of wheel dressing for the rapid production of annular and cylindrical forms has just been announced by the Sheffield Corporation, Dayton, Ohio. Circular form tools, crusher rolls, ball-bearing seals, seaming rolls, shift grooves in automotive and farm implement transmission gears, and other similar forms having intricate and precise profiles can be readily ground on this machine. The base, work-table, wheel-head, wheel-feeding mechanism, and semi-automatic crushing device are similar to those on the Model-101 Sheffield thread and form grinder previously placed on the market, but the work-head and work-head drive are completely new.

The variable-speed geared-head motor drives the work-head spindle in either direction through pulleys and two belts. The work-head spindle may be of either live- or dead-center construction, the live-center spindle having provision for manual closing of collets up to the 0.6875 inch size. Stepless adjustment of the work speed is available within a range of 60 to 360 R.P.M., but higher or lower additional work speeds can be provided for if desired.

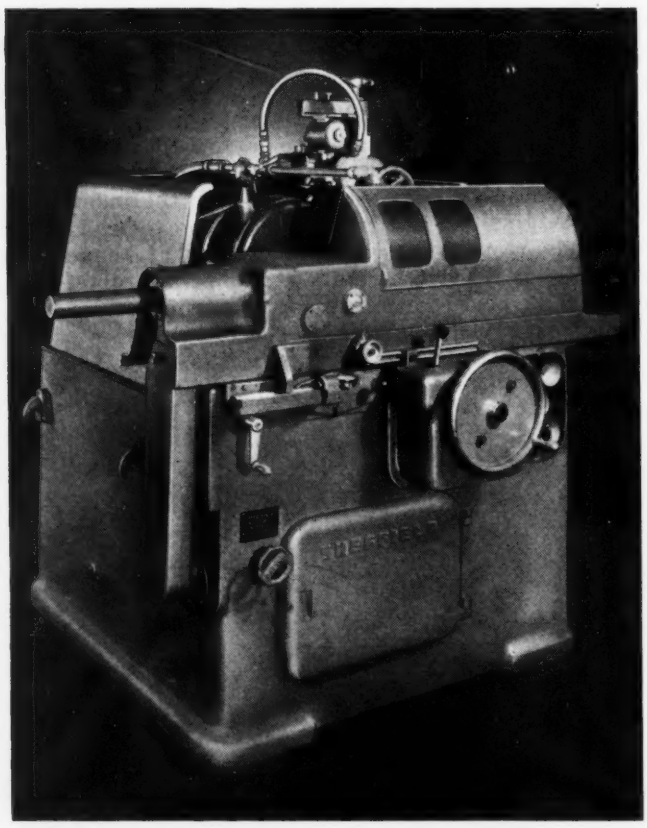
Table positioning is accomplished by means of a hand-crank which engages the lead-screw. A fine-adjustment knob provides micrometer control of the table position, and a table lock prevents any shifting of work with respect to the wheel during the work cycle. A precision spacing attachment, using standard gage-blocks and dial indicator, is available.

After the work is loaded, the operator lifts the throw-out lever, which brings the wheel-head toward the work for a distance of 0.111 inch, at the same time, the flow of coolant begins and the work-head revolves at the required speed. The hand-wheel, graduated in increments of 0.0005 inch, is used to feed the grinding wheel to the required depth. Automatic in-feed cycle operation is optional. Using the proper wheels, a surface finish of 10 to 15 micro-inches r.m.s. is obtainable, employing pressure as the means for truing the wheel. 77

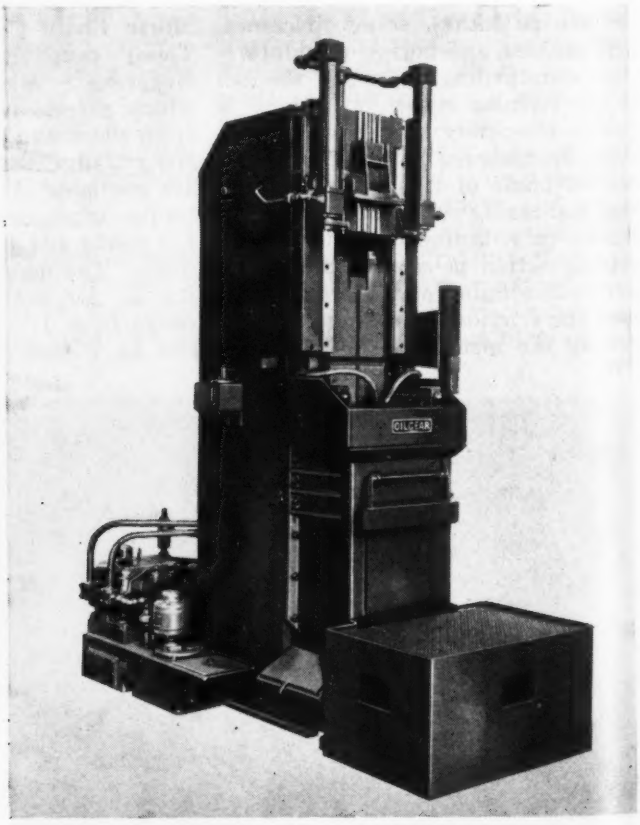
Vertical Pull-Down Broaching Machines

Five sizes of the new Type XP vertical pull-down broaching machine varying in normal pulling capacities from 5 to 37½ tons and having broaching strokes ranging from 24 to 66 inches are being placed on the market by the Oilgear Co., 1312-P W. Bruce St., Milwaukee 4, Wis. Outstanding features of these machines include automatic tool-handling mechanisms with adjustable bracket for tools of varying lengths; automatic puller operation; dual safety push-button control with selector switch for manual or semi-cycle operation; Oilgear regenerative stabilizing circuit; interlocked operation of tool-handling carriage and tool-pulling slide; automatic pressure lubrication of tool-slide, carriage, and ways; motor-driven cutting fluid pump and Oilgear controlled fluid power operation.

Each size machine is equipped with an Oilgear Type DX two-way, variable-delivery, heavy-duty, radial-piston power pump arranged for direct drive and of sufficient capacity to provide variable broaching speeds up to 30 feet per minute and independently variable return speeds up to 80 feet per minute. These self-contained, high-speed broaching machines will take peak loads up to 150 per cent of their normal rated capacities. Preset relief valves built into



Sheffield Precision Annular Form-grinder Utilizing the "Crushtrue" Principle of Wheel Dressing



New Type Vertical Pull-down Broaching Machine Brought out by the Oilgear Co.

To obtain additional information on equipment described on this page, see lower part of page 222.

Tubular Micrometer Designed for Measuring Bores without Removing Boring-bar

Twin-unit Arc-welder Brought out by the General Electric Co.

the pump serve to protect the work, tools, and machine against overload.

In broaching, the operator merely loads and unloads the work and depresses the push-button control. With this arrangement, the operator does not handle the tools, and is not required to actuate clamping levers manually.

Extra equipment includes pullers; tool-handling detents; fixtures; semi-automatic control; full-automatic control; control interlock with fixture; electric motor; starter; mounting for starter; and wiring of motor and starter through protective conduit.

Surface and internal broaching machines have the tool-pulling slide finished, and are provided with accurate right-angle key slots for mounting tool-holders and tools. The semi-automatic surface broaching cycle is selected through a built-in switch. 78

Inside Micrometers Designed for Measuring Over Boring-Bar

The measuring of bores without removing the boring-bar or changing the cutter settings can be easily accomplished with a new tubular over-the-bar inside micrometer manufactured by the Tubular Micrometer Co., St. James, Minn. The tubular micrometer is merely placed around the bar in the correct measuring position, as shown in the illustration, to permit taking the required measurement. Because of their structural lightness these new micrometers are especially easy to handle. Frames for all sizes of the tubular micrometers have a vacuum cavity in the center to insure minimum expansion and contraction. This prevents the heat of the hand from affecting the accuracy of the micrometer readings. The frames are hydrogen-brazed, and are plated with copper, nickel, and heavy chrome to resist wear and oxidation. The standard sizes are from 8 to 28 inches, covering a range of bar diameters of from 4 to 8 inches. 79

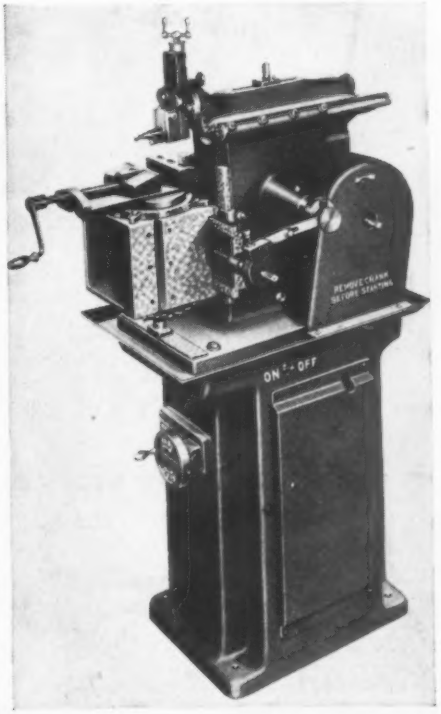
G-E Twin-Unit Welder

A twin-unit outdoor type alternating-current arc-welder, in a single enclosure, has been brought out by the Electric Welding Division of the General Electric Co., Schenectady, N. Y. The two circuits in this welder can be used simultaneously and independently with electrodes up to 3/16 inch in diameter or they can be combined into one circuit for heavy welding with 3/8-inch electrodes. The units have a current range of from 90 to 270 amperes when used singly, and from 180 to 540 amperes when operated in parallel.

Both welders are equipped with controls which reduce the open circuit voltage to approximately 30 volts when the machine is not actually engaged in welding. This arrangement makes full power available the instant the arc is struck. Both halves of the welder are supplied with current through a single set of primary terminals, so that only one power line circuit to the unit is required. Protection against the weather is provided by drip-proof construction of all openings in the top of the enclosure and by a sealed window which covers the current indicators. 80

Logan Shaper

The production of a new 7-inch shaper has been announced by the Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill. This shaper can be quickly and easily set up to handle a wide variety of work, including straight and angular cuts, and squaring, machining, and slot-

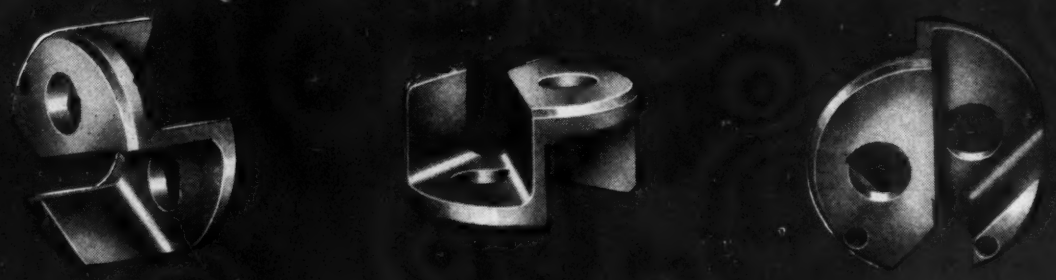


Shaper Brought out by the Logan Engineering Co.

To obtain additional information on equipment described on this page, see lower part of page 222.

How would you make these two wedge-shaped cuts?

. . . at lowest possible cost?



The PROBLEM . . .

Here's a small brass disk, on both sides of which a wedge-shaped cut must be milled. Usual practice would call for a series of indexes and passes under the cutter . . . with table advance and return for each index and pass.

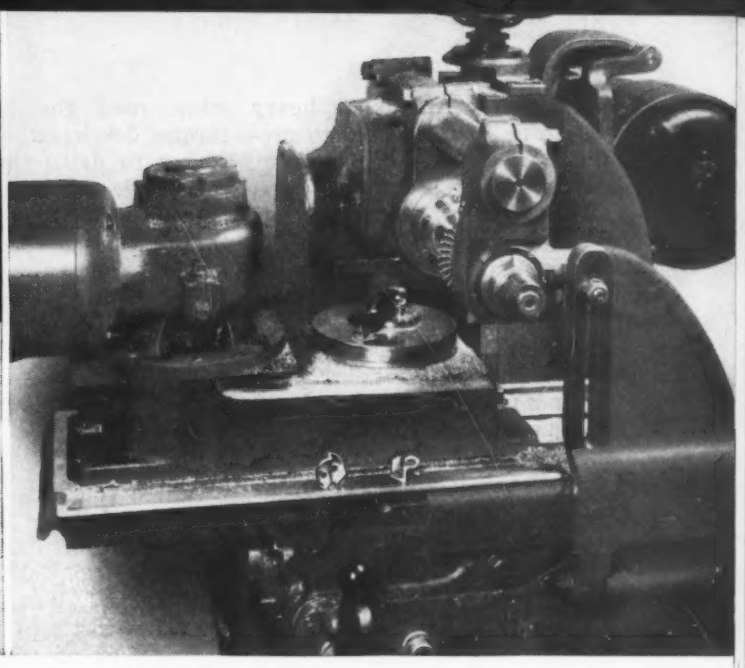
The SOLUTION . . . a No. 000 Plain Milling Machine and an oscillating attachment

especially designed by Brown & Sharpe

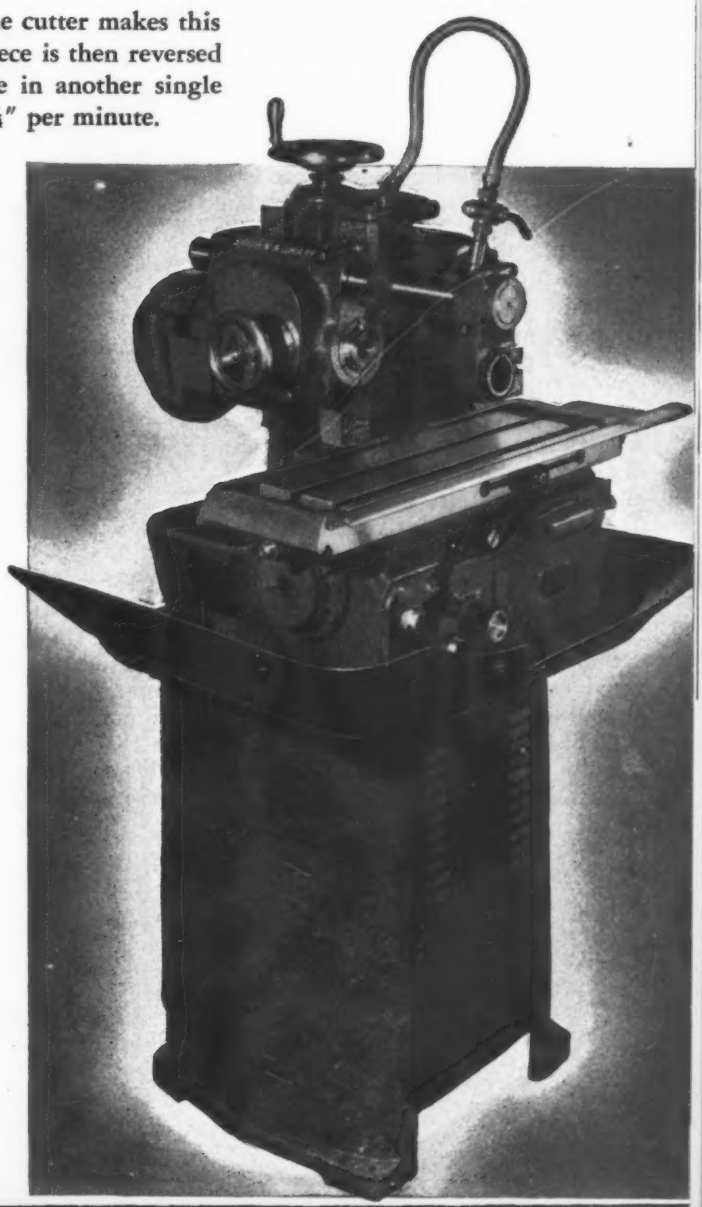
B·S

BROWN & SHARPE MFG. CO.
Providence 1, R. I., U.S.A.

BROWN &



The brass disk is oscillated as the table advances so that the cutter makes this wedge-shaped cut complete in one table movement. The piece is then reversed on the locating pins and the second, duplicating cut made in another single pass. Cutting time is 72% of operating cycle. Feed is 5¼" per minute.



That's the kind of production for which the No. 000 was designed . . . to save money on the rapid milling of small pieces. Broad, independent ranges of speed and feed enable this machine to handle a wide variety of materials efficiently . . . using cutters down to the smallest end mills. Automatic milling cycle plus the ease and speed of set-up and adjustment provide greatest possible economies of time and labor.

Brown & Sharpe Mfg. Co., Providence 1, Rhode Island, U. S. A.

& SHARPE

ting operations. An extra heavy cast-iron crank plate is used to provide ample power for each stroke. A roller-chain drive assures positive, slip-proof operation even on heavy cuts.

The new shaper has a maximum stroke of 7 5/8 inches, and can be operated at any speed from 64 to 175 strokes per minute. The speed can be changed instantly without stopping the motor or shifting the belt. The ram can be accurately set by a simple screw adjustment. There are six automatic feeds in either direction ranging from 0.002 to 0.012 inch, which can be reversed by a half-turn of the feed-handle. The tool-head can be swiveled and instantly reset to center by means of tapered locating pins. 81

Rotor Air Drills

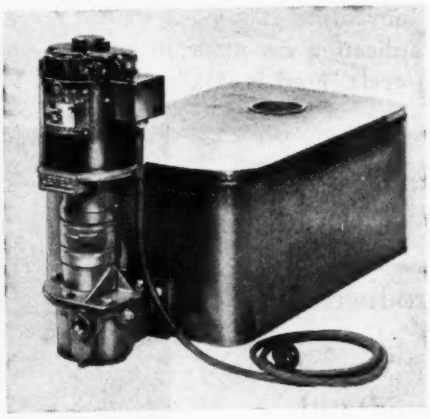
The Rotor Tool Co., Cleveland, Ohio, has developed two new small-size air drills—the Midget Type M-850, shown in Fig. 1, and the E-O Type M-1100, shown in Fig. 2. The Midget type has a capacity for drilling 1/16-, 1/8-, and 3/16-inch holes, and for light screwdriving and nut-setting. This drill weighs 1 5/8 pounds, and can be operated at speeds of 1000, 2000, 4000, and 20,000 R.P.M.

The Type E-O drill is equipped with a spade style handle and an auxiliary side handle. It has a capacity for drilling 1/4-, 5/16-, and 3/8-inch holes and driving 5/16-inch machine screws. The manufacturer claims that this drill has ample power for high-speed drilling under a full load and for heavy-duty screwdriving and nut-setting within its rated capacity. It can be operated at speeds of 1050, 1500, 2000, and 3000 R.P.M.

Both the drills are available with Rotor double-adjustment clutches when used for nut-driving. The torque developed by the air motor serves to drive the nut down, and the triple-action clutch then gives three impacts per revolution to set the nut or screw to a predetermined tension. The torque for each nut is set and the clutch release is controlled by an adjustable spring.....82

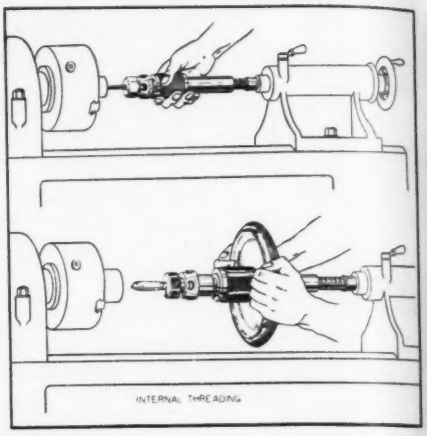
Delta-Milwaukee Coolant Pump and Tank

A new coolant pump and tank assembly has been developed by the Delta Manufacturing Division, Rockwell Mfg. Co., 600 E. Vienna Ave., Milwaukee 1, Wis., to meet the need for a low-cost unit for use wherever a free flow of coolant is required. The pump has a flat, machined flange



Delta-Milwaukee Portable Coolant Tank and Pump

which permits it to be readily applied to most machines employing a coolant. Up to 30 gallons of coolant per minute can be delivered by the pump at low heads, and up to 2 gallons per minute to a 14-foot head. The 1/4-H.P. motor is fully enclosed, double-sealed, and equipped with ball bearings lubricated for life. 83



Regular and Giant Sizes of "Grip-Slide" Threading and Tapping Tool

High-Speed Threading and Tapping Tool

The Thread Miller Corporation, West Orange, N. J., has announced through its sales offices at 17 E. 42nd St., New York 17, N. Y., the development of a new "Grip-Slide" tool, which is claimed to permit right- or left-hand threading and tapping work to be performed in a lathe at high speeds with complete safety to tools and operator. The guide bar on which the die- or tap-holder is a precision sliding fit is ring-marked at quarter-inch intervals to facilitate duplication of thread lengths. An Ettco chuck is furnished for holding taps, which provides a positive drive by gripping the square section at the end of the tap, in addition to holding the shank securely in accurate alignment with the machine spindle.

In operation, the holder is grasped and slid toward the work. When the thread is cut to the desired length, the grip on the tool is released, causing the cutting action to stop instantly. The lathe is then reversed and the tool again gripped for back-

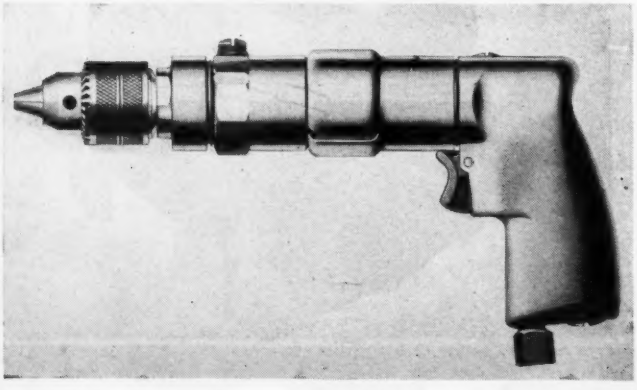


Fig. 1. Midget Air Drill Made by Rotor Tool Co.

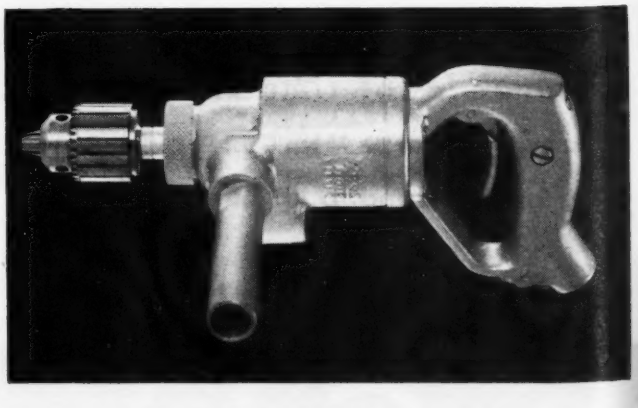
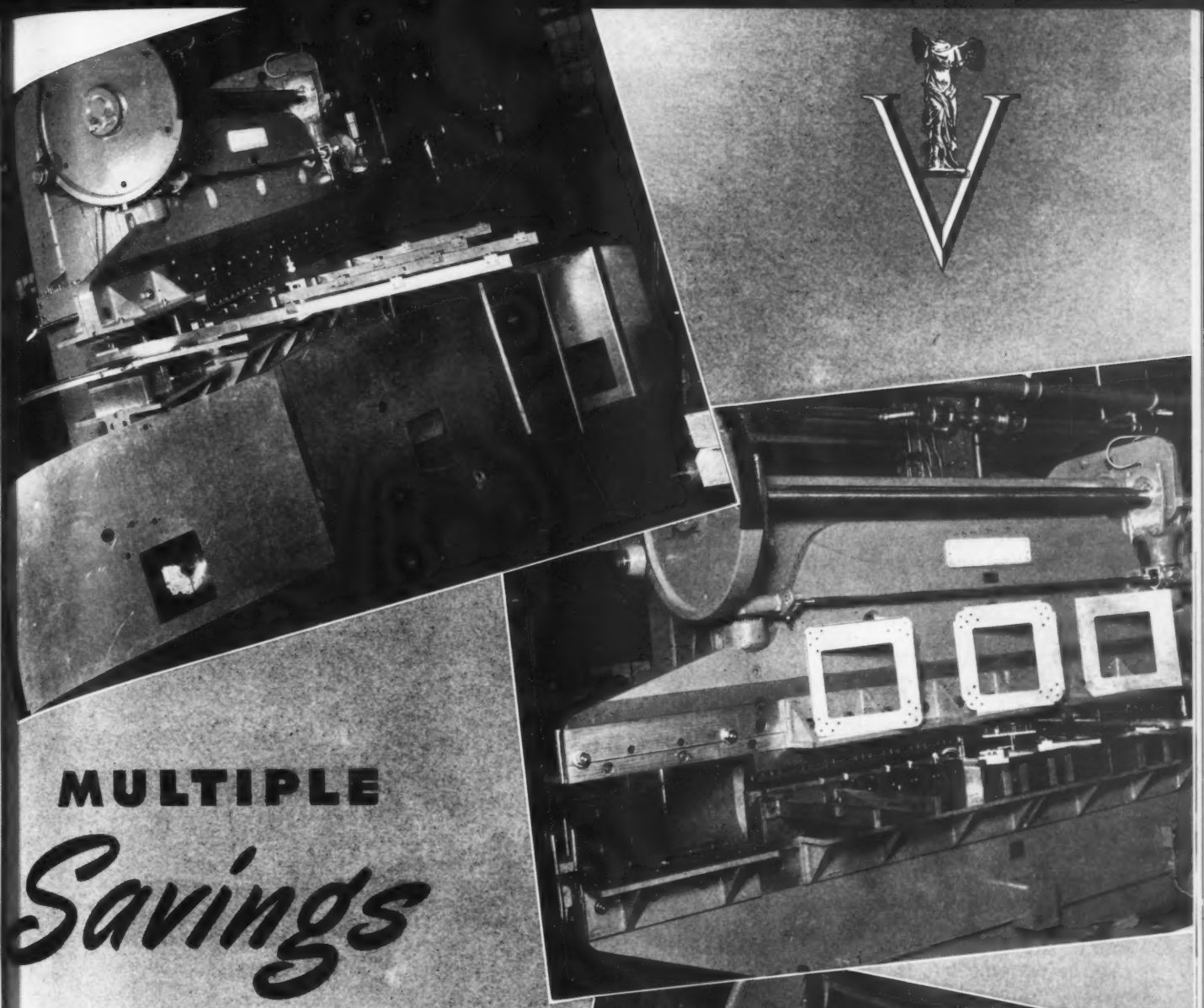


Fig. 2. Rotor E-O Type Air Drill

To obtain additional information on equipment described on this page, see lower part of page 222.



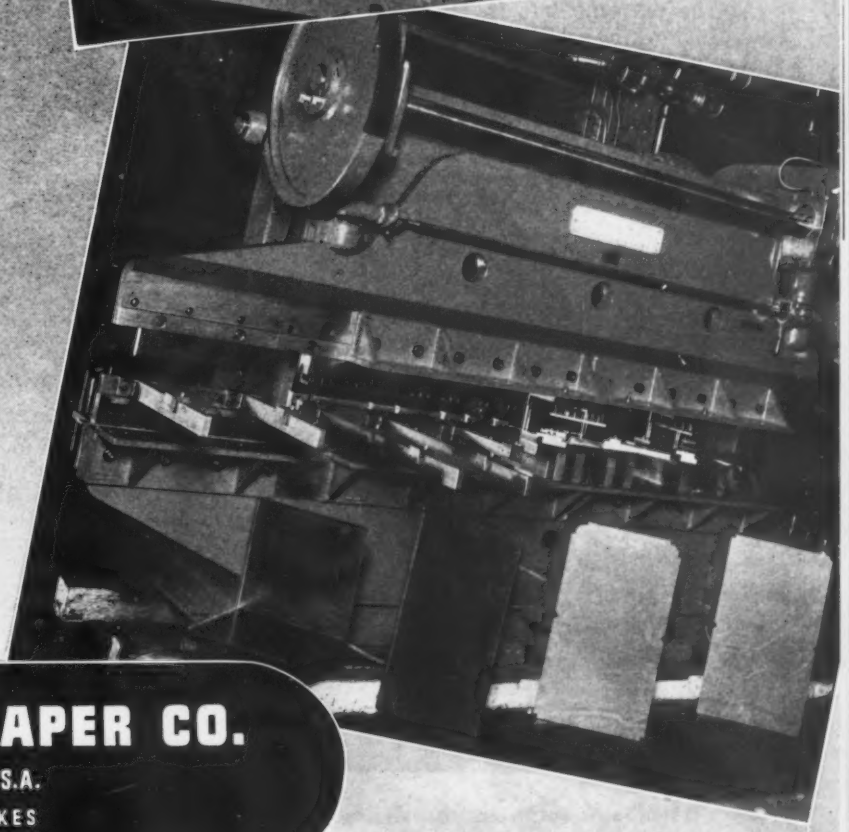
MULTIPLE *Savings*

Here one Cincinnati Press Brake producing steel cabinets has replaced a battery of machines—changed repeated floor-to-floor handling to one simple hand-to-hand transfer. The work is merely passed from man to man along one machine to complete the series of operations.

Marring has been practically eliminated, product has been improved, investment lowered, floor space conserved.

Perhaps a similar saving might be effected in your shop. Send us your problem.

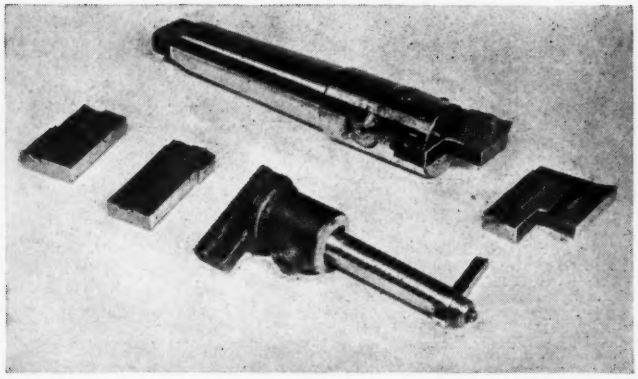
Write for Catalog B-2



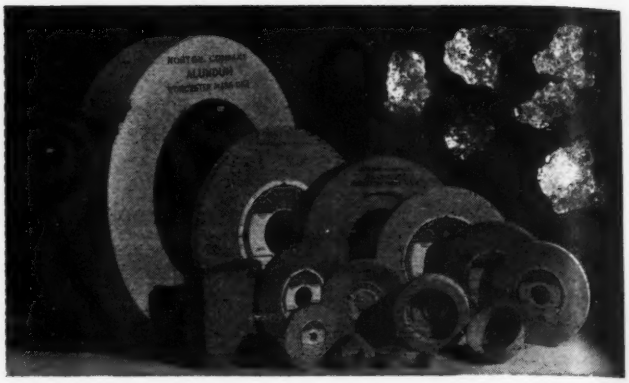
THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES



Boring-bars and Cutter Blades Placed on the Market by the Behr Products Co.



"32 Alundum" Grinding Wheels and Photomicrograph of Typical Grains of Abrasive

ing off the die or tap. The tool is furnished in two sizes—the regular size for use in bench and small engine lathes, and the "giant" size for use on larger lathes. 84

Behr Boring-Bars with Quick-Change Blades

A tapered-shank boring-bar designed to take cuts up to 3/4 inch on a side without chatter has been placed on the market by the Behr Products Co., Department 10, 13732 Woodward Ave., Detroit 3, Mich. The boring-bar and a facing or shoulder-boring blade that takes cuts at right angles to the spindle axis are shown in the two upper views of the illustration.

At the extreme left in the lower row of views is a back-facing or inverted boring blade. At the right of this blade is a single-end fly tool blade. A double-end cutting blade is also available in 3-, 5-, and 7-inch sweep sizes. A new adapter for boring holes less than 2 inches in diameter is shown in the lower right-hand corner of the illustration.

The boring-bar shown in the upper view is equipped with a dial for accurate adjustment, and is available in two models with capacities for boring holes up to 6 and 12 inches in diameter, respectively. 85

Norton Alundum Abrasive

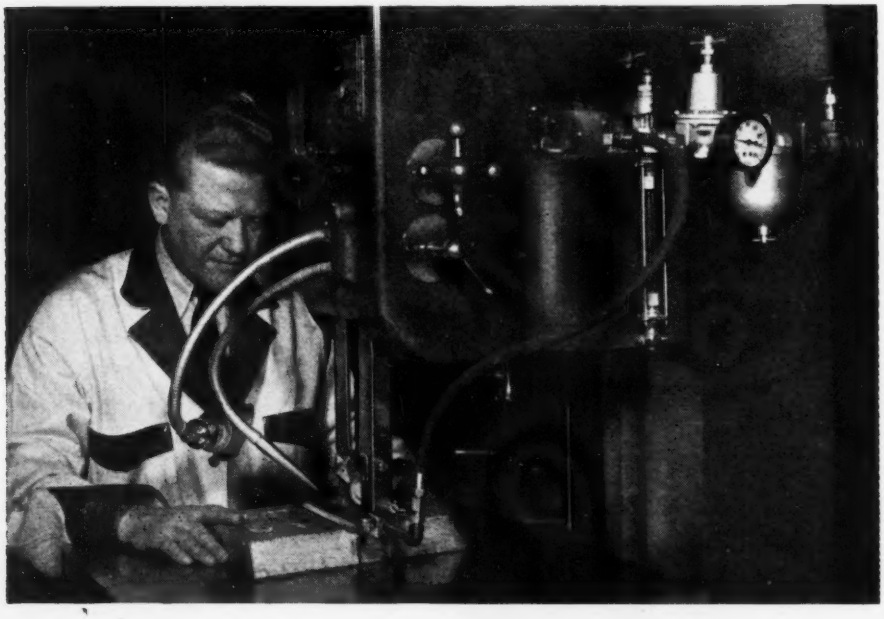
An aluminum-oxide product known as 32 alundum abrasive has been developed by the Norton Co., Worcester 6, Mass. It is made by a unique electric furnace process which produces grains of an improved shape and structure. The grains form in the electric furnace as single, individual crystals, which do not require the crushing to size previously necessary in making aluminum-oxide abrasives. Inasmuch as the crystals form individually, they assume a chunky, nubbly shape. The many plane surfaces form both exterior and re-entrant dihedral angles, the latter making definite rake angles which increase the cutting efficiency of the grains.

The sharpness of the abrasive gives wheels that cut fast and cool, and the chunky shape of the grains, plus more uniform bonding due to their high purity, gives long wheel life and freedom from frequent dressings. 86

DoAll Spray Lubricator for Band Saws

The DoAll Co., 1301 Washington Ave. South, Minneapolis 4, Minn., has brought out a unique spray lubricator for attachment to the high-speed band saws built by the company, which is said to furnish an economical and clean method of dissipating the heat produced by the saw blade. Faster cutting rates, improved finish, and increased saw life are advantages claimed for this attachment. The device operates from a standard air-pressure line.

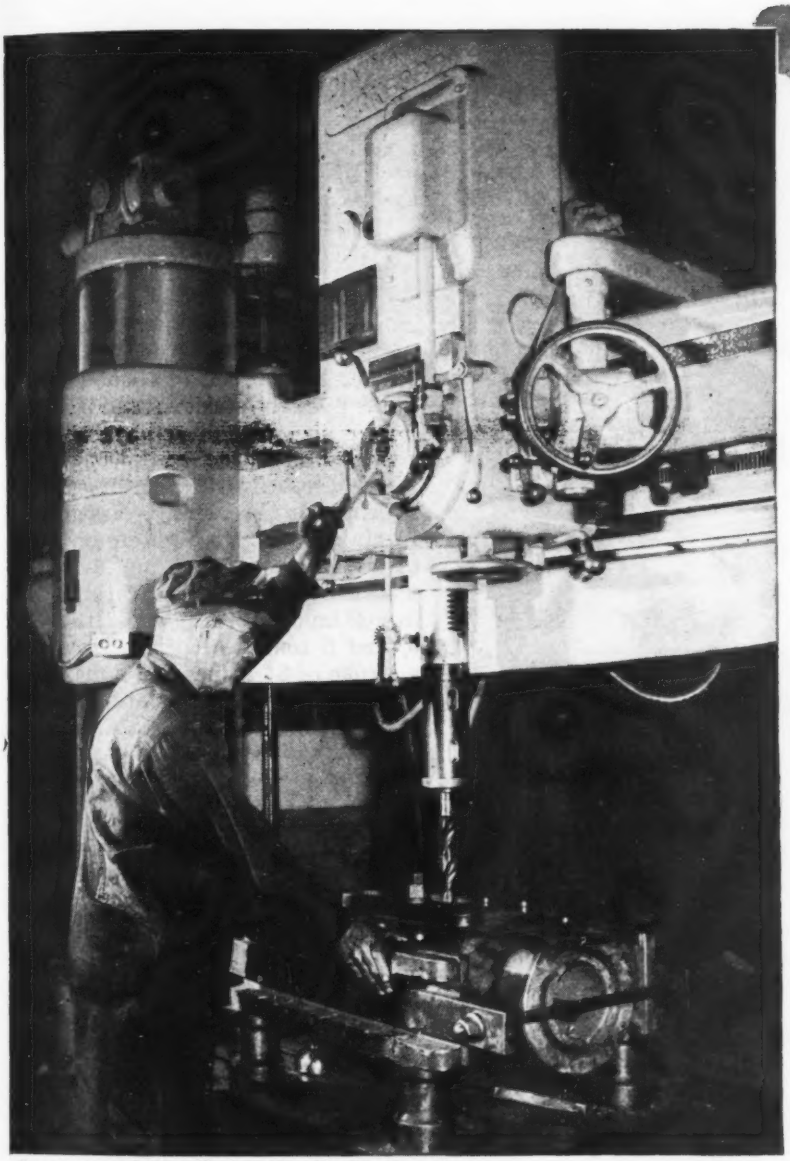
The spray head of the lubricator straddles the saw blade from the back side and directs twin streams of lubricated air against the saw teeth. The lubricant is thus forced under pressure in the form of metered mist into the saw teeth as they enter the work. Use of the coolant is regulated by a metering valve, so that the oil is prevented from accumulating on the table. This spray lubricator has been designed primarily for use in cutting non-ferrous metals, but operates equally as well on many types of plastics and laminated materials, where friction between the blade and work often softens the material to a gummy state. 87



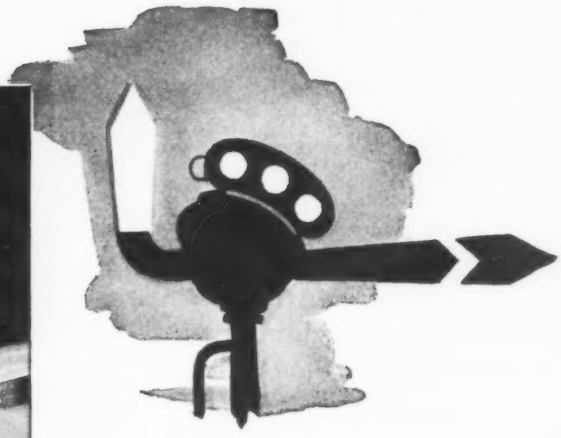
Spray Lubricator for Band Saws Built by the DoAll Co.

To obtain additional information on equipment described on this page, see lower part of page 222.

MANY MILES TO TRAVEL...



Courtesy of the Union Pacific Railroad



A locomotive crosshead has a job to do, and many miles of perfect performance are a must. Workmanship must be right.

This Cincinnati Bickford Super Service Radial Drill—accurate, dependable, easy and sensitive to the operator's control, is at work in a Union Pacific Railroad shop at Omaha, Neb.

Design features of Cincinnati Bickford Super Service Radial Drills make them profitable machines, either in high production work, or where versatility is needed.

Write for detailed Bulletin R-24A.

•

See our condensed catalog in Sweet's File.

RADIAL AND UPRIGHT SUPER SERVICE DRILLING MACHINES

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**

Black Center-holding Shank with Assortment of Six Interchangeable Noses

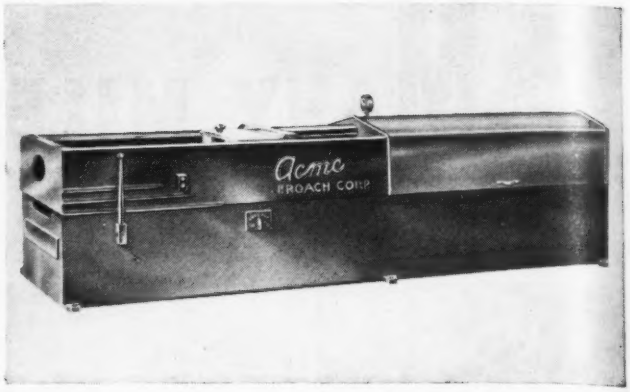


Fig. 1. Horizontal Hydraulic Broaching Machine Brought out by Acme Broach Corporation

Machine Center Shank with Interchangeable Noses

The Black Drill Co., Division of Black Industries, Inc., Cleveland, Ohio, is manufacturing a new line of patented machine centers in sets consisting of a single shank and an assortment of six noses that are threaded into the shank. Once the shank is placed in the spindle of the headstock or tailstock, it need not be removed, the center noses simply being interchanged to suit the requirements of the work.

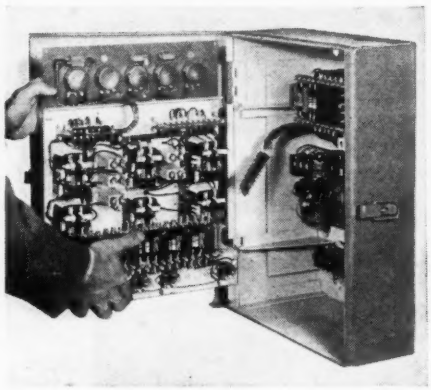
This center equipment is designed to save time, eliminate shank wear, and assure accuracy. The noses are made of high-speed steel, and are heat-treated to 65 Rockwell. Centers in a range of sizes from No. 2 to No. 12 are available for lathes and grinders, with Morse, Brown & Sharpe, and Jarno tapers, and with straight shanks adapted for use on screw machines. 83

General Electric Improved Timers for Resistance Welding

The General Electric Co., Schenectady 5, N. Y., has redesigned its complete line of sequence and sequence-weld timers for resistance welding. The new design permits quick change of the welding sequence, easy inspection and maintenance, and remote operation.

This equipment includes an improved electronic timing circuit that makes possible the consistent welding speed essential to high-production welding with short timing intervals. The sequence timer coordinates the mechanical operation of an air- or fluid-operated spot or projection welder with the flow of welding current, as determined by either a synchronous-precision or a non-synchronous weld timer.

The initiating circuit, normally 115 volts, can be easily changed to



General Electric Improved Timer for Resistance Welding

24 volts. All 60-cycle panels are suitable for operation on 208, 230, 460, or 575 volts, 50 or 60 cycles, and panels are available for other frequencies. 89

Acme Hydraulic Broaching Machines

The Acme Broach Corporation, E. Third St. at Delaware, Lexington 47, Ky., has developed a line of broaching equipment which includes the horizontal hydraulic broaching machine shown in Fig. 1, the vertical machine illustrated in Fig. 2, and a variety of automatic four-jaw broach pullers, keyway broaches, and keyway broach pullers.

The horizontal broaching machine is designed to be easily set up for a wide variety of work. The motor, hydraulic pump, and control valve are all mounted on a common base, which can be removed from the machine as a single unit for inspection and servicing. This machine is made in four regular sizes having normal capacities of 2, 4, 6, and 10 tons, and maximum capacities of 4, 6, 9, and 12 1/2 tons. The two smaller sizes have 36-inch strokes, and the two larger size machines have a stroke capacity of 54 inches.

The vertical hydraulic press is designed for broaching, assembling, forcing, and straightening. This press is made in 2-, 4- and 6-ton normal working capacity ratings, and in maximum working capacities of 4, 6, and 8 tons. All three sizes have a stroke of 24 inches and a maximum space between work-plate and ram of 30 inches. 90

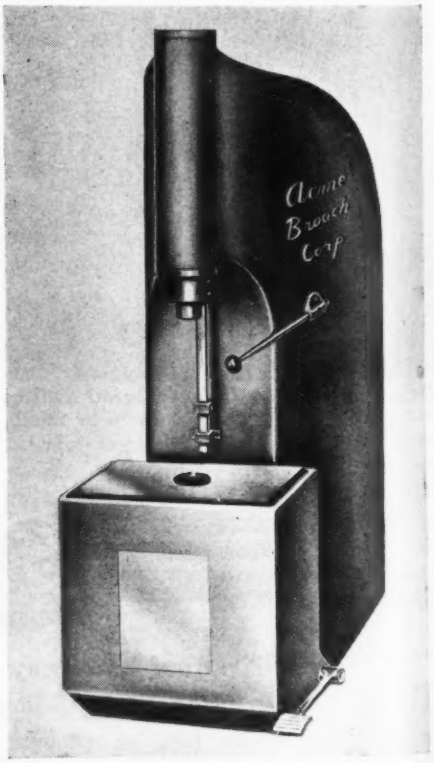
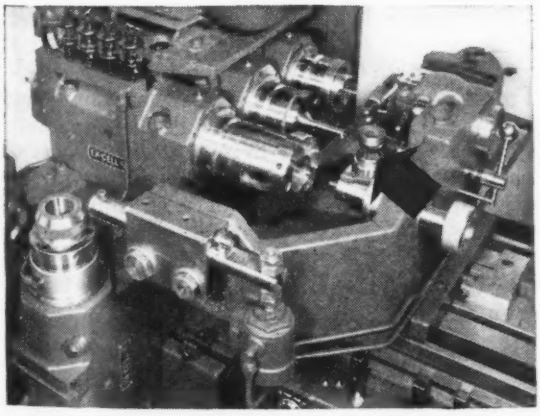


Fig. 2. Acme Hydraulic Broaching, Assembling, Forcing, and Straightening Press

To obtain additional information on equipment described on this page, see lower part of page 222.

When THE DEMAND IS FOR LOWER COSTS

...Scrap Your Obsolete Equipment!



Close-up of fixture and tooling set-up to turn O. D., face end, bore pin holes and finish sides of ring grooves of refrigerator compressor piston (note part indicated by ◄►). Four operations are executed on four pistons during one cycle of this Ex-Cell-O Precision Boring Machine.

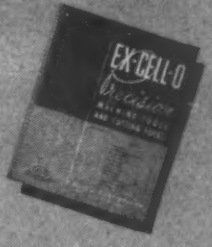
Obsolete machines are wasteful in today's competitive picture. Designed to help manufacturers meet the cost problem, Ex-Cell-O Precision Boring Machines frequently offer increased production, less handling of parts, smaller floor space requirements, and greater economy through multiple operations. These savings are the result of Ex-Cell-O's many years of experience in the manufacture of precision machine tools. In boring, as in many other metal-working operations, Ex-Cell-O engineering can show you the way to lower unit costs, through machines designed to meet your production problem.

XLO
EX-CELL-O for PRECISION

46-91

EX-CELL-O makes

- Standard and Special Multiple Way-Type Precision Boring Machines
- Multiple Drilling and other Special Purpose Machines
- Precision Thread Grinding Machines
- Precision Lapping Machines
- Broaches and Broach Sharpening Machines
- Continental Cutting Tools
- Tool Grinders
- Hydraulic Power Units
- Grinding Spindles
- Drill Jig Bushings
- Drill Chip Breakers
- Inspection Fixtures
- Fuel Injection Equipment
- R. R. Pins and Bushings
- Pure-Pak Paper Milk Bottle Machines
- Aircraft and Miscellaneous Production Parts



GET YOUR FREE COPY of this useful book. Illustrates and describes Ex-Cell-O's complete line of Precision Machine Tools, Cutting Tools, and facilities for parts production. Write today for your free copy of Ex-Cell-O Bulletin 27121.

EX-CELL-O CORPORATION • DETROIT 6

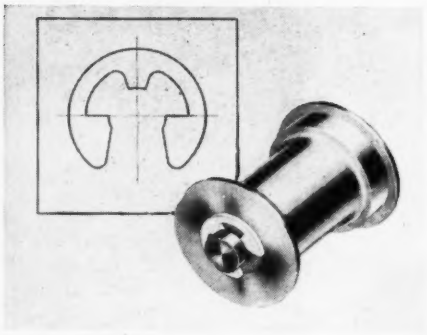


Fig. 1. Truarc E-shaped Retaining Ring for Small Shafts

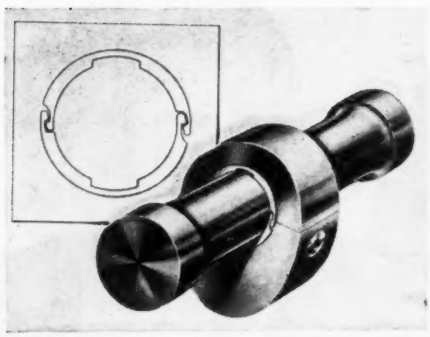
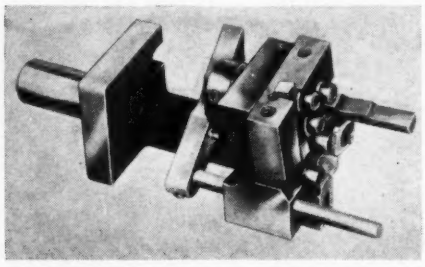


Fig. 2. Truarc Two-part Interlocking Retaining Ring

Truarc Retaining Rings

The Truarc Sales Division, Waldes Kohinoor, Inc., 47-10 Austel Place, Long Island City 1, N. Y., has just announced two improved Truarc retaining rings. The new E-shaped ring shown in Fig. 1 is designed to provide an unusually large and uniformly protruding shoulder on shafts 3/32 inch in diameter and over. It can be sprung into a comparatively deep groove, and will withstand considerable thrust. Recesses between the three equally spaced protrusions which enter the groove in the shaft provide sufficient resiliency to permit the necessary spread for quick, easy assembly. This type ring is especially adapted for use on business machines, radios, household appliances, instruments, clevis pins, and similar products.

The two-part interlocking retaining ring shown in Fig. 2 was developed during the war. It forms an annular shoulder of uniform section height completely around the shaft, and is of dynamically balanced design, a feature that particularly adapts it for use on parts which rotate at high speeds, such as the spindles of textile machines. Because of its positive interlocking action, this ring cannot be lifted out of its groove by high centrifugal forces or expansion caused by the friction of contacting surfaces. The ring can be easily disassembled, however, by a slight prying action with a screwdriver. 91



Profile-turning Box-tool for Automatic Lathes

Profile-Turning Box-Tool for Automatic Lathes

A profile-turning box-tool that can also be used as an ordinary roller box-tool has been designed by Manchester Repetition Engineers, Ltd., of Manchester, England, and is being made available in this country through the Accreylon Co., 130 W. 42nd St., New York 18, N. Y. Savings in production time can be made by utilizing the profile arrangement for turning multi diameters, contours, and tapers at one pass of the tool, thus eliminating the use of two or more forming tools and leaving open extra turret and cross-slide stations for use on other operations.

The profiling arrangement is so designed that a square face can be left on the work-piece when doing work of increasing diameters, but a radius is shown on decreasing diameters that usually can be finish-machined by the use of the cross-slide. The tangential tool is held in a fixed slot by means of two clamping screws and washers, and the depth of cut is adjusted without loosening the tool by means of a screw bearing on the profile bar slider. An additional screw allows for fine adjustment of the cutting edge of the tool to the center of the work, which is perpendicular to the bottom face of the blade. 92

Universal Tool Kits

A new series of universal tools designed to replace a large number of individual tools is announced by the Standard Pressed Steel Co., Box 22, Jenkintown, Pa. These Hallowell speed tool kits are applicable to most general industries, and, in a few instances, have been made for specialized industries and concerns. Four types of kits are available—a socket-screw kit for driving socket set, cap, Phillips, and slotted-head screws; a socket-wrench kit containing six- and twelve-point hexagonal sockets from No. 4 up to and including 1/2 inch; an automobile kit; and a home kit. 93

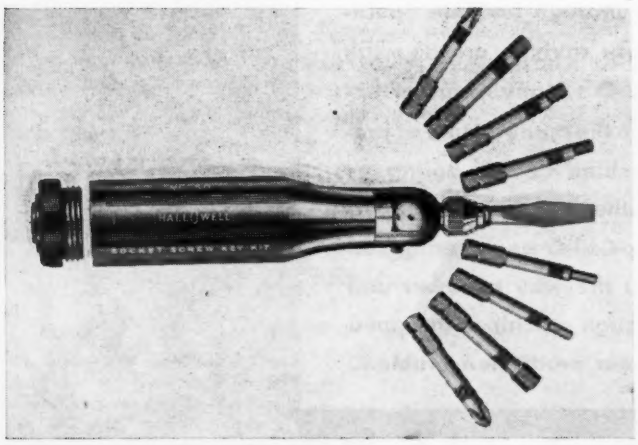


Fig. 1. Hallowell Socket-screw Kit, which Includes a Wide Range of Tools

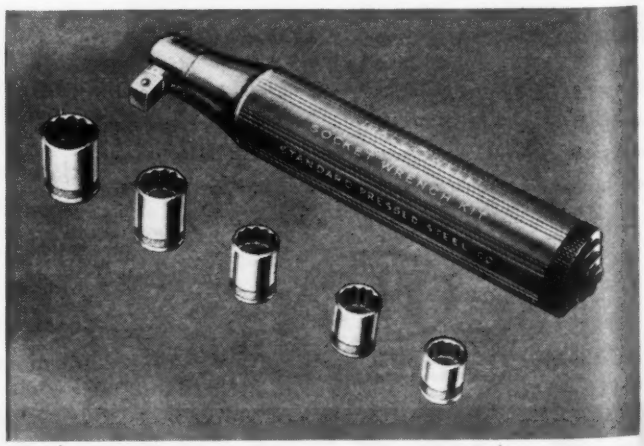
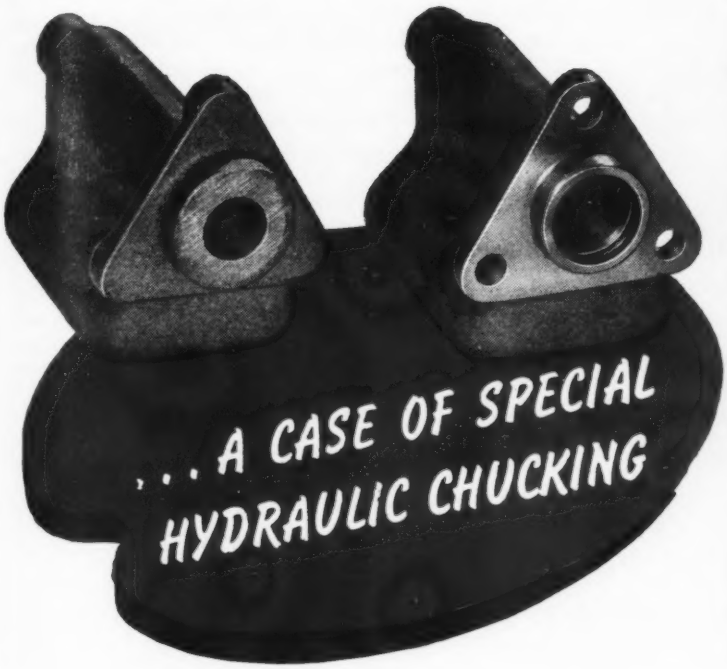
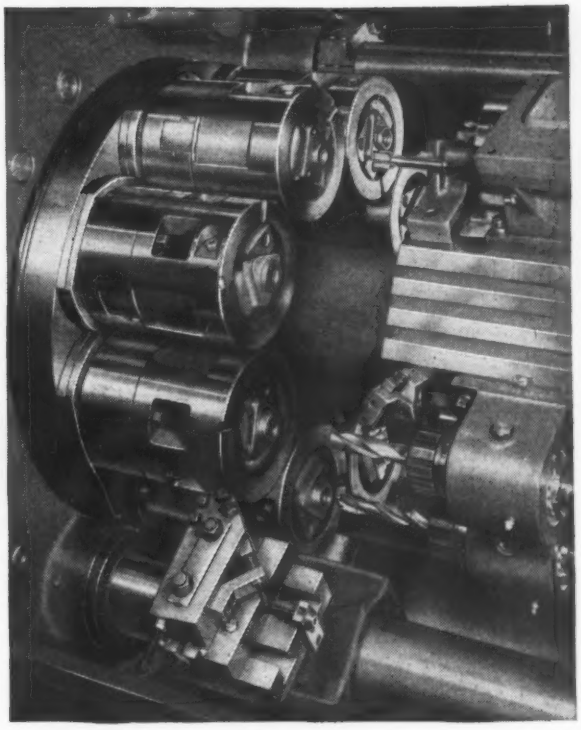


Fig. 2. Socket-wrench Kit Provided with a Series of Hexagonal Sockets

To obtain additional information on equipment described on this page, see lower part of page 222.

LEADERSHIP BASED ON ACCOMPLISHED FACTS



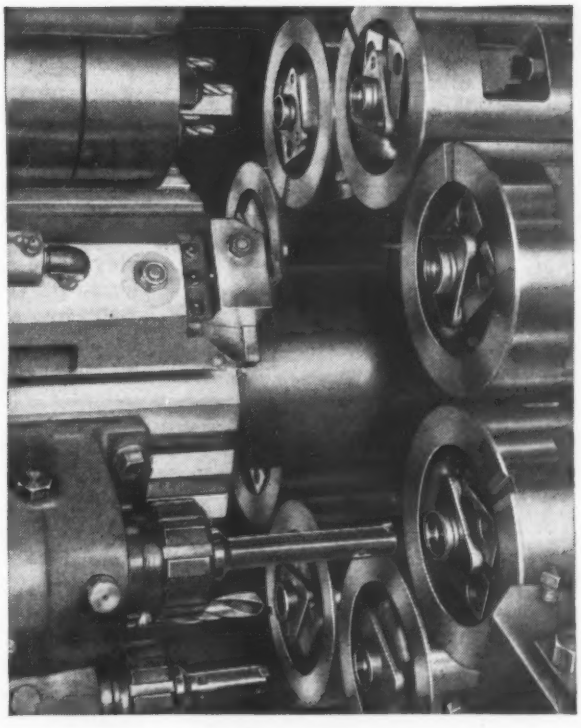


Entirely open end construction...
Loading position easily accessible

The master cylinder and supply tank illustrated above is manufactured by the Wagner Electric Corporation of St. Louis on a Model 88 New Britain eight spindle automatic work rotating chucking machine. The most difficult problem encountered in tooling this job was to synchronize the multiple drill head with the irregular shaped flange for accurate drilling of three mounting screw holes.

Our engineers developed a special hydraulically operated chucking fixture which positions the piece exactly the same at each chucking — permitting, with an ingenious locating device, proper synchronization of the drill head and the work. Otherwise the flange holes would have required a separate rehandling and a drill press operation with a resultant increase in the cost per piece.

Let our engineers help you to save extra operations in the machining of your work. Be sure to check with our field representatives or our home office about that new product you are designing or about better methods to machine your present products.



REAR VIEW: Note accessibility of all tools

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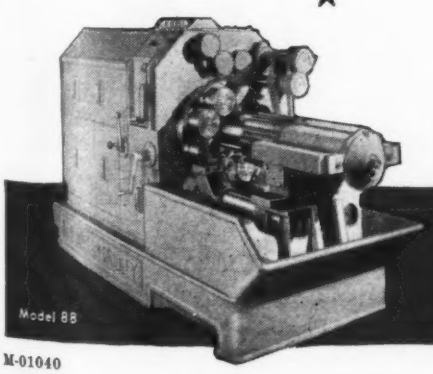
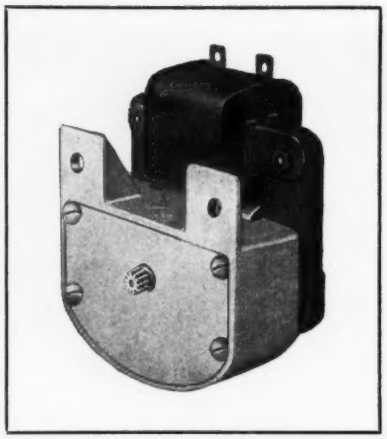


NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
NEW BRITAIN-GRIDLEY MACHINE DIVISION

M-01040



Kurman Self-starting Small Synchronous Motor

Self-Starting Small Synchronous Motors

The Kurman Electronics Corporation, 35-18 Thirty-Seventh St., Long Island City 1, N. Y., is now manufacturing a line of small, self-starting synchronous motors that require an input of only 1 1/2 watts and produce a starting and synchronous running torque of 10 inch-ounces at 1 R.P.M. These motors are adapted for use in industrial timing devices and time controls, time delay relays, and similar equipment.

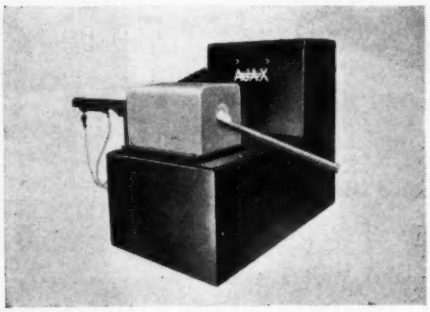
The standard motor illustrated is designed to operate on 100- to 125-volt 60-cycle lines, and has a load shaft speed of 4 R.P.M. The pinion normally provided on the shaft of this motor has ten teeth of 64 pitch and a pitch diameter of 5/32 inch. Lower speeds are readily obtained by adding a gear sub-assembly of the proper ratio. The motors can be furnished for voltages of from 1 to 250 and frequencies of 25 to 120, and for rotation in either a clockwise or a counter-clockwise direction. They are only 2 by 2 3/8 by 1 1/4 inches in size, and weigh approximately 9 ounces. 94

New Head-rest Welding Goggle Made by American Optical Co.

Ajax Induction Heater for Continuous Heating of Steel Slugs

Designed for continuous, automatic heating of steel slugs or forging blanks prior to forging operations, an Ajax-Northrup induction heater, developed by the Ajax Electrothermic Corporation, Trenton, N. J., features an automatically timed pneumatic feeding device. Cold slugs are loaded into a roller type chute on the left side of the heater, fed in a continuous succession through the horizontal heating coil by a pneumatic ram, and dropped out at the other end of the coil into a chute or tongs, ready to be placed in the forging dies. Production rate with slugs 3 3/8 inches in diameter by 1 3/4 inches long is 350 per hour, each slug being uniformly heated to about 2200 degrees F. Power is supplied by a 200-K.W. motor-generator set operating at about 1000 cycles per second.

The induction heater can be converted from one job to another by changing the heating coil, resetting the timing device, and adjusting the feeding chute. Various sizes of coils are available. 95



Ajax Induction Heater with Automatic Work-handling Equipment

Head-Rest Welding Goggle

A head-rest welding goggle which can be thrown instantly into "off guard" position for the rapid inspection of set-ups has been added to the line of the American Optical Co., Southbridge, Mass. Developed to eliminate waste motion and speed up welding operations, the goggle can be flipped above the eyes with one hand, where it is held securely by the friction joint.

The goggle is adjustable for individual features, and is equipped with opaque eye-cups designed to be worn directly over the eyes or over personal prescription glasses. It also has indirect side shields, which keep out stray light rays, sparks, and metal splashes, and yet provide sufficient ventilation to reduce troublesome fogging. 96

Wyco "Universal" High-Speed Flexible-Shaft Grinder

Grinding efficiency, flexibility, and easy operation are features claimed for the new Wyco "Universal" high-speed flexible-shaft grinder, manufactured by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago 22, Ill. This compact grinder can be either set on a bench or suspended from a hook, or when complete mobility is desired, it can be suspended from the operator's belt. It operates at a speed of 10,000 R.P.M., and is made in three sizes for light, medium, and high-speed work, including such operations as grinding, burring, filing, sanding, and polishing. The three sizes have 1/4-, 1/12-, and 1/18-H.P. universal type motors.

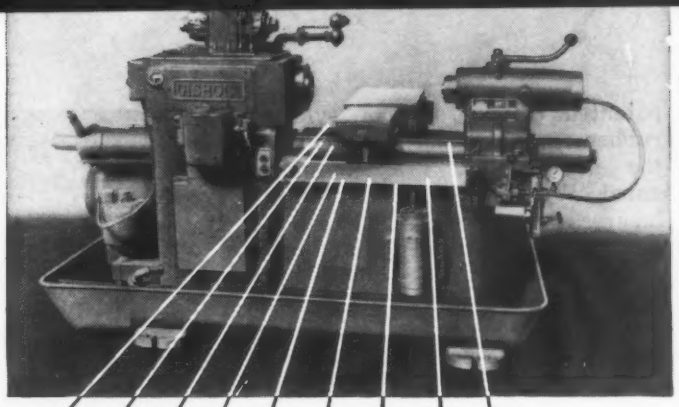
The flexible shafts have the Wyco

Wyco "Universal" High-speed Flexible-shaft Grinder

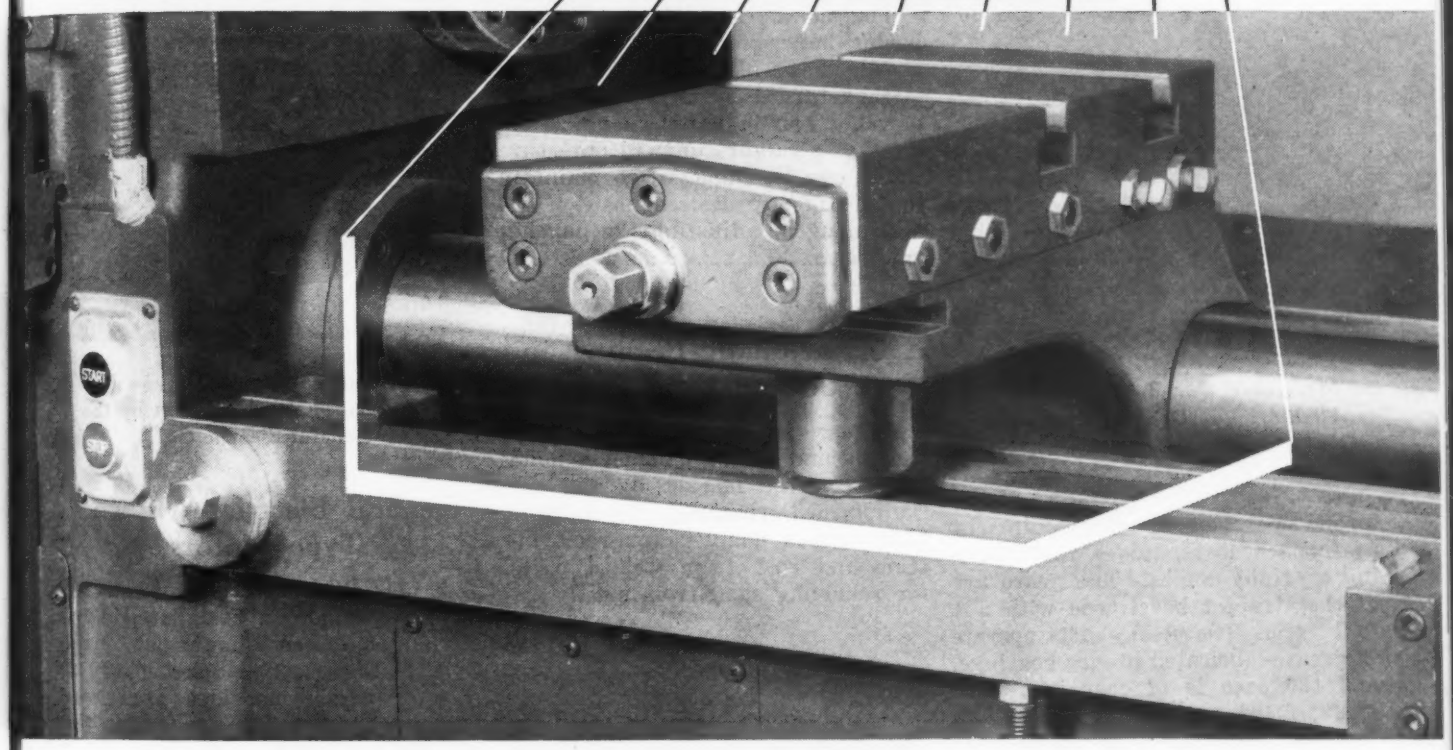
To obtain additional information on equipment described on this page, see lower part of page 222.

Why this front carriage is more versatile

Here's one of the many reasons why this machine can perform a number of different machining cycles and handle a remarkably wide range of work for an automatic lathe.



THE GISHOLT HYDRAULIC AUTOMATIC LATHE



The front carriage is clamped to, and receives its longitudinal motion from, a large diameter hardened steel bar along which the carriage may be clamped at any position.

The outer support for the carriage is a hardened steel beam of rectangular section, pivoted at one end and with an up-and-down motion for the other end provided by the piston-cylinder unit on the front of the machine. Raising or lowering this beam imparts a transverse movement to the carriage.

Many combinations of transverse and longitudinal motions can be made at both feed and traverse rates to meet practically every requirement. An angular in-feed attachment may be added for advancing multiple tools into the work at a controlled angle.

With a rear slide which can be placed on the bed table to feed in or out, straight or angularly, you have the combination that means faster, lower cost production on a wide variety of parts. Write for literature.

GISHOLT MACHINE COMPANY

1209 *E. Washington Avenue* • *Madison 3, Wisconsin*

Look Ahead... Keep Ahead with Gisholt

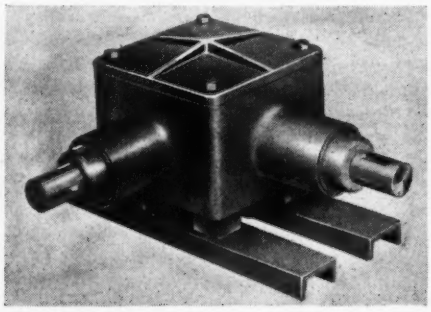
GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

patented casing, oilproof synthetic rubber covering, and are lined with the non-metallic, graphite-impregnated Wyco "Inner-Liner," which insures a vibrationless and true running shaft. Ball bearing hand-pieces are equipped with 1/8- and 1/4-inch collets, and are said to be cool-running. The 1/4-H.P. model is of sufficiently rugged construction for use in diemaking, and can be employed with a toolpost holder for light grinding in the lathe. 97

Miter-Gear Drive Unit

An angle drive unit has been developed by Payne Dean & Co., Madison, Conn., for slow-speed, high-torque operation of such equipment as furnace doors, valves, and shafting at right angles. The gears are of the straight bevel type with a 1 to 1 ratio. The steel shafts operate in grease-lubricated bronze bearings, and the case is of cast iron with gasket-fitted cover and oil seals in the bearings. The unit can be used in any operating position, and is weatherproof.

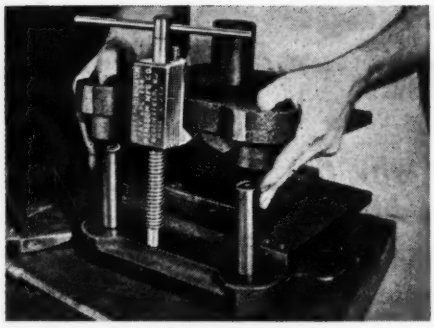


Miter-gear Unit for Slow-speed, High-torque Drives Made by Payne Dean & Co.

Two sizes are available, one with a capacity of 1000 inch-pounds and the other with a capacity of 4000 inch-pounds; both are rated on the basis of five-minute operation. The unit has no feet, but is drilled at four points in the base for bolting to common channel iron. 98

Persson Safety Jacks for Separating Die Sets

A safety die jack designed to permit faster and easier separation of die sets is being manufactured by the Persson Mfg. Co., 2 Henry St., Bloomfield, N. J. This die jack can be quickly applied to the punch-holder, and enables a single operator to elevate the holder to any height required and to lower it without appreciable effort.



Safety Die Jack Made by Persson Mfg. Co.

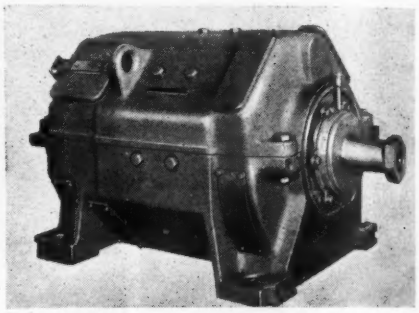
The jack is clamped to the punch-holder between the guide pins, as shown in the illustration. The screw is then turned by means of the removable handle bar. The jack exerts a straight upward pressure which can be employed to maintain the die in any desired position for measuring or adjusting the punches or dies. 99

Aro Pneumatic Peening and Scaling Hammer

A new Model 7002 air-powered peening and scaling hammer is being placed on the market by the Aro Equipment Corporation, Bryan, Ohio. This tool is adapted for removing scale and rust from welded parts, for removing sand from small castings, and for peening tubular rivets and other small parts. Although designed to deliver 5000 blows per minute, it will not distort light sheet metal when used for such operations as removing scale.

Aro Pneumatic Peening and Scaling Hammer

The piston and cylinder of this tool are made of alloy steel and are precision-ground. The length of the hammer head is 2 1/2 inches, and the length of the hammer 7 inches. The small size of this tool permits it to be used in areas that are difficult to reach with ordinary tools. The connection between the hammer head and body can be of any desired length. The body of the tool is cast aluminum, and is fitted with an automatic throttle valve. 100



Direct-current Armored Type Mill Motor Placed on the Market by the General Electric Co.

General Electric Armored Type Motors

A new line of direct-current armored mill motors, designated Type MD-600, has been brought out by the General Electric Co., Schenectady 5, N. Y., which provides increased horsepower in smaller space than the MD-400 series that is being replaced. The new line will be available in ratings of from 5 to 200 H.P.

Solid roller bearings, close-coupled, are used in all sizes of the motors to permit greater load-carrying capacity. Adaptability of the frame to various enclosures allows easy change-over between protected, totally enclosed, or separately ventilated types. In addition, high-temperature silicone resin varnish is used as a binder for the mica on the armature coils, and sparkless commutation beyond 200 per cent load allows the motors to be used under severe operating conditions. All existing ratings of the American Iron and Steel Engineers pertaining to horsepower, speed, temperature, and mounting dimensions are maintained, but the next larger rating will be obtained in the present frame size. 101

To obtain additional information on equipment described on this page, see lower part of page 222.

do you have Oil Seal Troubles?

Superfinish can solve them!

For example, here's the case where a shaft with two oil seal bearings was installed with ground surfaces. Driven by a ¾ h.p. motor at 1,750 r.p.m., the oil seals created enough heat to burn the shaft and stop the motor. To make matters worse, it was later found that twice the original speed was necessary.

These oil seal surfaces were *Superfinished* and a new motor installed which turned the shaft at 3,500 r.p.m. With the *Superfinished* surfaces, no heat was developed at this increased speed. No further trouble was encountered.

Superfinishing is a quick, simple and inexpensive process. Oil seal bearings are but one of the many applications where it can save money, not only by eliminating trouble, but in many cases, by reducing your manufacturing costs as well. Gisholt engineers are ready to advise you concerning its applications.

GISHOLT MACHINE COMPANY

1215 East Washington Ave. • Madison 3, Wis.

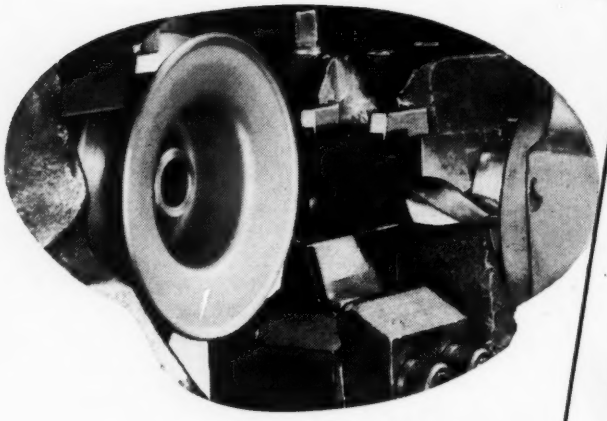
Look Ahead...

Keep Ahead...

with Gisholt...

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



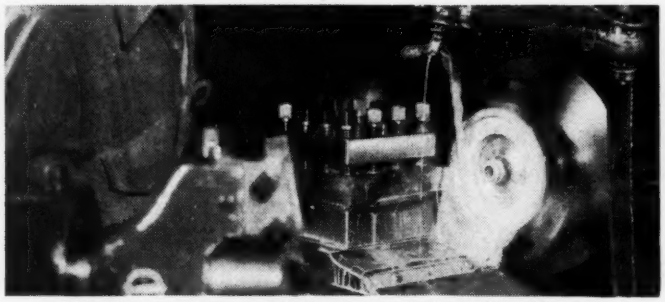
JOB LOT WORK or MASS PRODUCTION

CARBOLOY
CEMENTED CARBIDES

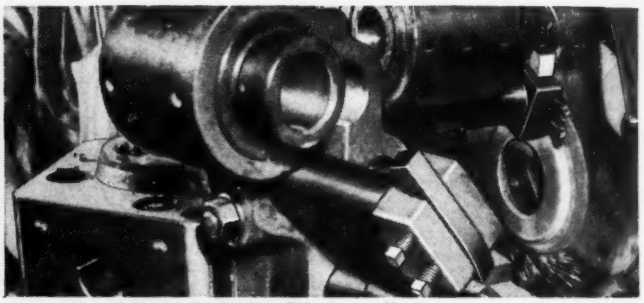
"Standards"

Speed Output—Cut Costs!

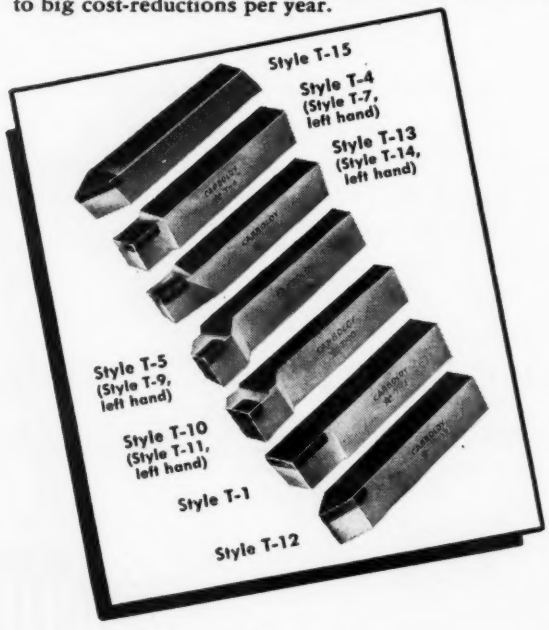
Machines Run 4 Times Longer Per-Tool-Grind! In job-lot machining of cast iron pulleys, "Standards"—adapted to 8 roughing and finishing operations—held down initial tool costs, stepped up production, kept machines running 4 times longer per tool grind.



4 Stations on Turret Eliminated—19 Tools Saved! By tooling up with Carboloy Cemented Carbide "Standards", 4 turret stations were eliminated, 19 tools saved. Savings like this, month after month, add up to big cost-reductions per year.



80% of Hand-Polishing Eliminated! High surface finish obtained in mass-production machining of this steel gear made possible cutting hand-polishing time 80%.


Style T-15
Style T-4 (Style T-7, left hand)
Style T-13 (Style T-14, left hand)
Style T-5 (Style T-9, left hand)
Style T-10 (Style T-11, left hand)
Style T-1
Style T-12

CHANGE TO CARBOLOY "STANDARDS" FOR RESULTS LIKE THESE IN YOUR PLANT

A change to Carboloy Cemented Carbide "Standards" is a change to increased production, better finish, lower cost. Available in 11 Standard Styles—adaptable to 60%-80% of the turning, facing and boring jobs, they are actually priced lower than ordinary tools in many sizes.

For a useful guide to most efficient use of "Standards", grades, prices, specifications, etc., write today for Catalog GT-175R.

The word "Carboloy" is a registered trademark of Carboloy Company, Inc., sole makers of Carboloy Cemented Carbides.

CARBOLOY COMPANY, INC.
11147 E. 8 Mile Avenue • Detroit 32, Michigan

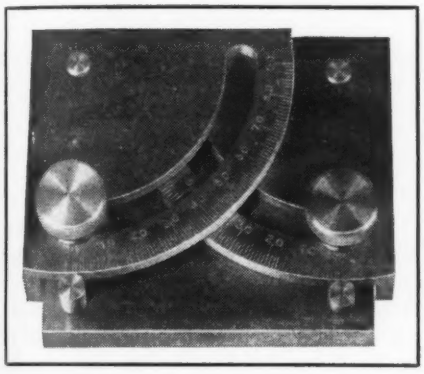
Standard CARBOLOY TOOLS
(TRADEMARK) CEMENTED CARBIDE

STOCKED BY AUTHORIZED CARBOLOY CEMENTED CARBIDES DISTRIBUTORS IN 69 CITIES Coast To Coast

CHICAGO • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES • MILWAUKEE • NEWARK • PHILADELPHIA • PITTSBURGH • THOMASTON

Universal Angle Protractor for Tool-Grinding Work

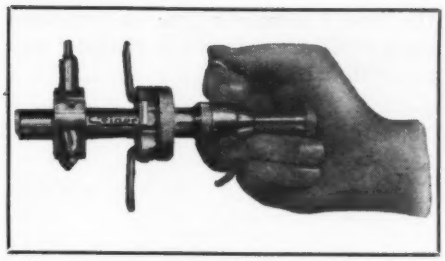
A universal angle protractor has just been brought out by the Willey's Carbide Tool Co., 1340 W. Vernor Highway, Detroit 1, Mich., which can be used on all makes of carbide-tool grinders. It provides a dual change of angles from 0 to 90 degrees, thus speeding up production by permitting two tools to be ground simultaneously at the same or different angles. Although designed primarily for grinding applications, this instrument can also be employed for a variety of operations; for example, it can be used as an angular guide for drilling, grooving, and milling. 102



Willey's Angle Protractor for Carbide-tool Grinders

Aluminum-Bronze Welding Electrode

A coated aluminum-bronze electrode for the welding of copper and copper-base alloys and for high strength joining of cast iron, malleable iron, and steel to bronze and brass alloys has been announced by Ampco Metal, Inc., Milwaukee 4, Wis. This electrode, known as the "Ampco-Trode AC," is made in five grades, with a range in deposit hardness of from 119 to 300 Brinell. Those grades producing the softer deposits are used as joining electrodes and also as overlay deposits for bearing surfaces and for corrosion- and wear-resisting surfaces; the harder grades generally are employed for surfacing. The electrode is an AC-DC type having a coating that facilitates striking and maintenance of the arc with low-voltage alternating-current transformer welders and without the use of auxiliary excitation devices. 103



Rapid Bore Gage Made by the Stiger Precision Products Co.

New Type of Bore Gage

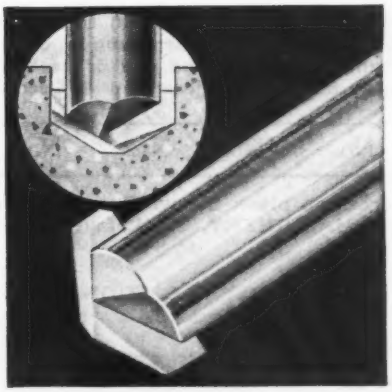
The Stiger Precision Products Co., 4616 W. 20th St., Cicero 50, Ill., is producing a new adjustable gage for rapidly measuring and checking bores. By compressing the plunger, an accurate reading can be taken showing the amount of metal that must be removed to obtain the "Go" size. Three live points equally spaced on the gage touch the sides of the bore and register the reading on the shaft.

When the job is changed, the gage can be easily set and adjusted to the new size. Readings from 1 to 12 inches can be obtained with a set of five gages, thus eliminating the need for all types of plug gages. 104

Kennametal Drills

Kennametal, Inc., Latrobe, Pa., is now producing a line of Kennadrills for rotary drilling of concrete, brick, asbestos, and other non-metallic construction materials. These drills have cutting tips of Kennametal, and are so designed that the tip extends beyond the diameter of the shank, thereby providing generous annular clearance space around the shank for cuttings. This minimizes the possibility of binding.

No starting punch is required in using Kennadrills on very hard or brittle materials, and glazed surfaces are not chipped or cracked, because the tip takes hold readily. Any rotary type of drilling machine or spindle-driving device can be used to operate these drills. 105

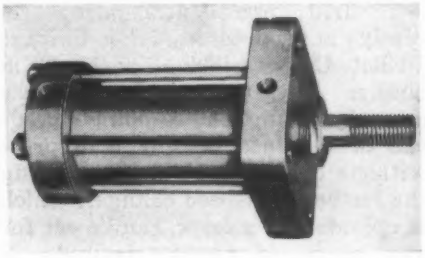


Kennametal Drills for Use on Non-metallic Construction Materials

Oakland Air Cylinders

The new line of air cylinders now being manufactured by the Oakland Engineering Co., Inc., 800-100th Ave., Oakland 3, Calif., includes sizes and types designed to cover a wide range of applications in which push, pull, lifting, or pressing forces are needed for either direct or indirect use. These cylinders have been developed to replace more complex mechanisms and to increase production rates.

The cylinders are furnished with drilled mounting holes to facilitate assembly. Extra strong heads and steel tie-rods serve to maintain a high degree of safety. Shouldered piston-rods are employed to hold the pistons square with the cylinder walls, and the piston glands are made of bronze. Oil- and moisture-proof leather cups are standard packing equipment, but special asbestos molded cups can be provided where heat presents a problem. The cylinders are made of corrosion-resistant brass tubing. 106

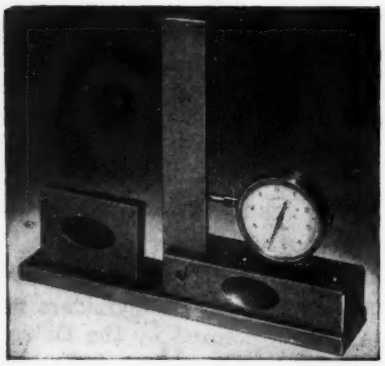


Air Cylinder Made by Oakland Engineering Co., Inc.

"Micro-Sine" Square

A new precision angle square known as the "Micro-Sine" is being placed on the market by the Acro Tool & Die Works, 4554 Broadway, Chicago 40, Ill. This new square is specially designed for the rapid checking of right angles on precision work in tool and die shops, machine shops, and testing laboratories to an accuracy of 0.0001 inch. A standard indicator shows instantly the amount of any error, where the error is lo-

To obtain additional information on equipment described on this page, see lower part of page 222.



"Micro-Sine" Precision Angle Square

cated, and the amount of correction required. It can be used as a standard for checking master squares, tri-squares, and tools, as well as for checking work. This square is available in two types, one having the standard precision gage reading to 0.0001 inch, and the other a lever indicator reading to 0.001 inch.....107

Speed-Changer for Drill Presses

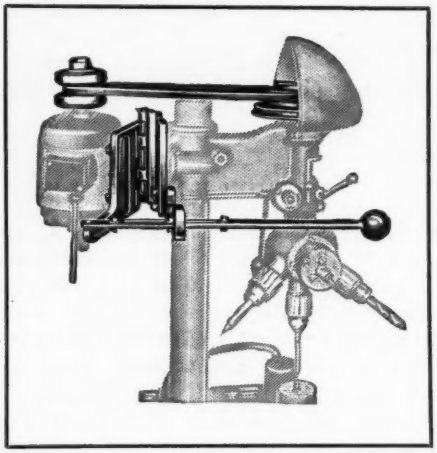
With the "Instant Speed Changer" —a drill press attachment recently announced by the Chicago Drillet Corporation, 1729 N. Winchester Ave., Chicago 22, Ill.—the correct drilling and tapping speeds can be obtained on any drill press without changing belts or stopping the motor. The speed changer, which is operated by a lever, can be set for any range of speeds desired. A standard drill press equipped with the unit and a standard four-step cone, V-belt pulley will have a speed range of 435 to 4550 R.P.M. All steps of the pulley can be used, and the speed changer can be installed on a drill press without making any alterations. 108

* * *

How to Mount a Grinding Wheel

The correct procedure in mounting a grinding wheel on the wheel sleeve of a precision grinding machine is as follows:

First, the wheel should be tapped lightly with a small wooden mallet or a block to be sure it is of sound structure. Unless a clear ring is emitted, the wheel should not be mounted. Being satisfied that the wheel is sound, one of the blotters supplied by the wheel-maker should be placed on the sleeve. Then the wheel may be mounted. Do not force it on the sleeve; it should slide on easily. Now place another blotter on the wheel-sleeve flange and slide this onto the sleeve. Line up the cross-mark on the flange with a similar mark on the sleeve and insert the screws. Draw the screws up snugly, making sure that the wheel is gripped between the blotters. Do not first draw one screw up as tight as possible and then the next one. Draw up the first until it is merely snug. Then go to the diametrically opposite screw and draw it up snug. Then draw up the screw 90 degrees from the others and continue this procedure, taking up a little at a time until all screws are tight. This is important, because unless the flange is drawn down evenly against the wheel, the latter may be cracked.—*Grits and Grinds, published by the Norton Co.*



Drillet Speed Changer for Drill Presses

* * *

Unique Timken Display for Russian Industrial Exposition

A unique display that the Timken Roller Bearing Co. has planned for the International Industrial Exposition to be held in Moscow late this year was shown to the public recently in New York City in the workrooms of Messmore & Damon, Inc., who constructed the display. The outstanding feature is a one-quarter size 2-ton working model of a modern locomotive. The boiler and cab section of this model are separate, and are periodically raised and lowered by means of an automatic mechanism. When the boiler and cab are raised, the driver and truck wheels are in operation. The housings are cut away so that the operation of the Timken bearings, with which all the axles are equipped, can be seen. Murals depict various industries in which Timken bearings are extensively used.

To Obtain Additional Information on Shop Equipment

Which of the new or improved equipment described in this section is likely to prove advantageous in your shop? To obtain additional information or catalogues about such equipment, fill in below the identifying number found at the end of each description—or write directly to the manufacturer, mentioning machine as described in October, 1946, MACHINERY.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Fill in your name and address on blank below. Detach and mail within three months of the date of this issue to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

NAME..... POSITION OR TITLE.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

FIRM.....

BUSINESS ADDRESS.....

CITY..... STATE .....

To obtain additional information on equipment described on this page, see lower part of page 222.

Increase life of tools

ONE of the most important advantages of *Texaco Cutting and Soluble Oils* is their widely proved ability to increase tool life. Results like the following are reported by users —

—Hob life extended 100%
—Counterbore life upped 60%
—Drill life increased from 15 to 70 pieces
—Chaser life tripled
—Tap life boosted 150%
—Broach life lengthened by 20%
—Lathe tool life increased tenfold
—Reamer life doubled

Whatever the tool or the metal, *Texaco Cutting and Soluble Oils* will help you machine faster and better. They lubricate and cool, prevent chip welding; permit higher cutting speeds and fewer rejects. You can depend on them for increased production, with better finish.

Texaco Lubrication Engineers, specializing in cutting coolants, will gladly assist you. Call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT — CBS

Questions and Answers

A Department in which the Readers of MACHINERY are Given an Opportunity to Exchange Information on Questions Pertaining to the Machine Industries

Verbal Contracts Covering More Than One Year

P. F.—We contracted verbally to make delivery of a certain number of machines monthly for one year. Subsequently, through correspondence, the term of this contract was increased to three years. We would like to cancel the contract. Can we do so?

Answered by Leo T. Parker, Attorney at Law
Cincinnati, Ohio

It is universal law that verbal contracts which cannot be performed within one year are rendered void by the Statute of Frauds. However, according to a recent higher court decision a verbal contract, verified by correspondence, automatically becomes a written contract, and such verbal contracts are valid as being equivalent to written contracts. A case in point is Illinois, 52 N. E. (2d) 47, reported December, 1943, where it was disclosed that a buyer and a seller entered into a written contract for the sale of machinery. The term of this contract was one year. Later they made a verbal contract which was almost identical to the written one, but with the provision that the original contract was to be extended from one to two years. Many letters passed between the parties, in which this verbal agreement was mentioned. The seller broke the two-year contract and the buyer filed suit for damages. The seller defended the suit on the grounds that the agreement was oral and void under the Statute of Frauds, because it could not be performed within one year.

The higher court refused to agree with this argument and held that the correspondence verified the verbal agreement, that the contract was legally "written," and that it was not within the Statute of Frauds, which requires agreements that cannot be performed within one year to be in writing. Therefore, it is my opinion that you must live up to your contract.

Material for Internal Gears Subjected to Severe Shock Loads

T.H.B.—In one of our machines we use an internal gear approximately 10 inches in diameter with a face width of 2 inches. This gear is subjected to severe shock loads when in operation. It is anchored in place, and operates a planetary system of gears. The fifty-nine-tooth internal gear meshes with an eighteen-tooth pinion mounted on the driven shaft. The materials tried for these gears have been bronze castings and an alloy cast iron, but the gears do not stand up well in service. Can you recommend a material for these gears that is likely to give better service?

Answered by Editor, "Nickel Steel Topics,"
Published by the International Nickel Co., Inc.

It is suggested that the pinion be made of either casehardened 2315 or 4320 steel, or of a direct-hardening steel such as 8640, quenched and tempered to a hardness of approximately 350 Brinell. The internal gear should be made from cast steel, normalized and tempered to a hardness of approximately 225 to 250 Brinell. This hardness can be secured in a cast steel of an analysis similar to that of an 8630 steel.

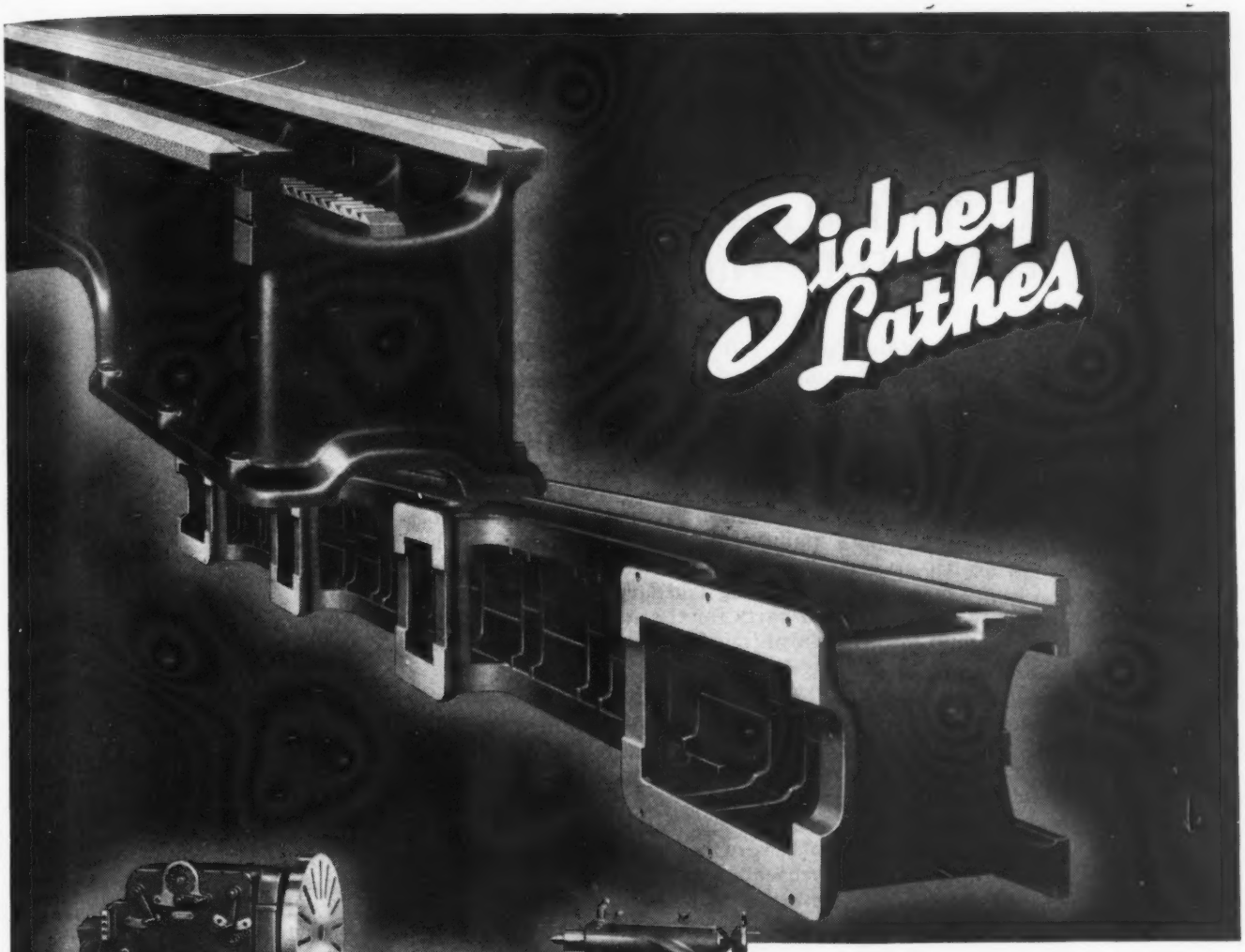
* * *

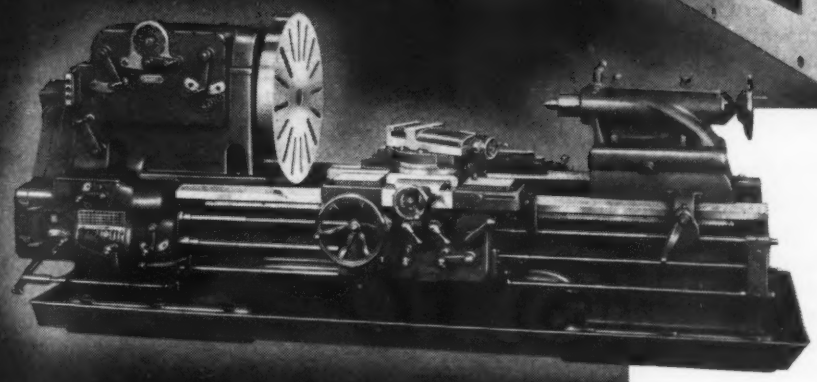
Cemented-Carbide Saws Facilitate Installation of Heating and Control Equipment

A new type of electric saw with Carboloy cemented-carbide teeth has been developed by the Minneapolis-Honeywell Regulator Co. for use in installing heating and control equipment in buildings already erected. When this saw is used, there is no need for subsequent redecorating, because the Carboloy saw cuts a smooth, clean groove in the plaster or other material instead of chipping the edge.

The saw is 5 inches in diameter, and is used in connection with a Black & Decker "Shorty" 1/4-inch drill which provides a right-angle drive. With this equipment, the necessary grooves in plaster or concrete walls and floors are cut cleanly and quickly. The copper tubing of the control system is then embedded in the grooves and covered with plastic filler and masking tape, so that the completed job is virtually unnoticeable. A special suction guard attached to a vacuum cleaner picks up all loose plaster or cement, simplifying cleaning up.

With the new carbide saw, the cost of installing individual apartment heating controls in older type buildings is said to be no greater than when the installation is made in a house under construction.





Builders of Precision Machinery
THE SIDNEY MACHINE TOOL COMPANY
SIDNEY • OHIO
SIDNEY
ESTABLISHED 1904

Rigid Bed Construction

This modern bed cast of semi-steel, nickel mixture provides close grained, hard bearing surfaces for Carriage ways. Beds having three vees assure greater rigidity to Carriage and Tailstock for heavy straight or taper turning. The three vees and flat present a greater bearing surface and provide more support to Carriage bridge. Note that the massive bed is provided with longitudinal girt reinforced by two-wall cross girts at 24″ intervals assuring accuracy under heaviest service in resisting deflections and torsional strains.

Bulletins on all sizes available.

New Trade Literature

RECENT PUBLICATIONS ON MACHINE SHOP EQUIPMENT, UNIT PARTS, AND MATERIALS

To Obtain Copies, Fill in on Form at Bottom of Page 230 the Identifying Number at End of Descriptive Paragraph, or Write Directly to Manufacturer, Mentioning Catalogue Described in the October, 1946, Number of MACHINERY

Cleaning Handbook

PHILLIPS CHEMICAL CO., 3400-66 Touhy Ave., Chicago 45, Ill. Handbook on production and maintenance cleaning. Copies can be obtained without charge if requested on a company letterhead sent directly to the Phillips Chemical Co.

Tools

NATIONAL TWIST DRILL & TOOL CO., Rochester, Mich. Catalogue 16, covering the complete line of tools made by the company, including twist drills, reamers, milling cutters, counterbores, end-mills, hobs, and special tools. A 60-page engineering data section contains tables of drilling, milling, gear data, etc. Copies are available through the company's local distributors. 1

Kennametal Cemented-Carbide Products

KENNAMETAL, INC., Latrobe, Pa. Catalogue 46, covering Kennametal cemented-carbide products, including data on the proper selection and application, as well as on methods of use and maintenance. Booklet entitled "Characteristics of Kennametal," describing the various compositions and their properties, including suggestions for designers...2

Ball Bearings

NEW DEPARTURE, DIVISION GENERAL MOTORS CORPORATION, Bristol, Conn. Third in a series of technical treatises on ball bearings for designers and engineers. Part III—entitled "Engineering Service"—covers enclosure and lubrication for all operating parts. Parts I and II deal with bearing types and fundamentals of mounting practice. 3

Engineering Production

BORG-WARNER CORPORATION, Chicago, Ill. Catalogue entitled "For the Record," reproducing a series of paintings illustrating a few of the many phases of the corporation's engineering and large-scale production of parts for the automotive, aviation, farm-implement and other industries.....4

Broaching Manual

COLONIAL BROACH CO., P. O. Box 37, Harper Station, Detroit 13, Mich. 172-page combination broaching manual and catalogue, covering all phases of broaching—broach design, broaching equipment, and methods; profusely illustrated with photographs showing all types of broaching operations. 5

Handbook on Abrasives and Grinding Wheels

NORTON CO., Worcester 6, Mass. Handbook on abrasives and grinding wheels, containing extensive information of value to the user, including data on various grades, wheel speeds, and a selection table covering the correct wheel to use for a wide variety of materials and products....6

Resistance Welding

GENERAL ELECTRIC CO., Schenectady 5, N. Y. Bulletin GET-1189, containing detailed information on the resistance welding process, covering selection of equipment, welding electrodes, and preparation for welding. Treatise entitled "Fundamentals of Electronic Control for Resistance Welding." 7

Rolled and Forged Steel Circular Products

BETHLEHEM STEEL CO., Bethlehem, Pa. Bulletin 216, illustrating the various types of rolled and forged steel circular products made by this company, including gears, industrial wheels, brake drums, pistons, and many other parts. 8

Grinding Wheel Data Book

SIMONDS ABRASIVE CO., Tacony and Fraley Sts., Philadelphia 37, Pa. Grinding Wheel Data Book, containing 127 pages covering types of wheels, grades, bonds, and other information of use in selecting the correct wheel for various classes of work. 9

Tool Grinders

D-S GRINDER DIVISION, ROYAL OAK TOOL & MACHINE CO., 623 E. 4th St., Royal Oak, Mich. Bulletin illustrating and describing the D-S tool grinder, designed to grind radial relieved cutters, as well as to handle angular back-off and standard relief sharpening. 10

Automatic Press-Room Equipment

U. S. TOOL COMPANY, INC., Ampere, N. J. Bulletin 50, illustrating and describing the U. S. line of automatic press-room equipment, including slide and roll feeds, stock straighteners, stock reels, stock oilers, etc. 11

Combined Roll-Crusher and Wheel-Dresser

MOORE SPECIAL TOOL CO., INC., 734 Union Ave., Bridgeport 7, Conn. Catalogue illustrating and describing the Moore Panto-Crush wheel-dresser, which combines roll-crushing and pantographic diamond dressing.....12

Cleaning Welds

CHICAGO MFG. & DISTRIBUTING CO., 1928 W. 46th St., Chicago 9, Ill. Booklet entitled "How to Clean Welds," covering all phases of weld cleaning, including complete instructions for beginners. 13

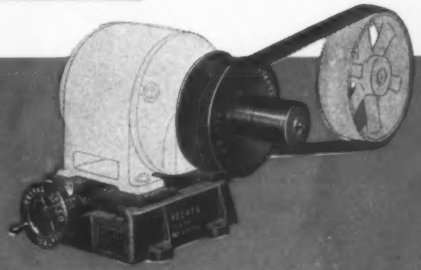
Protective Coatings

AMERICAN PIPE & CONSTRUCTION CO., AMERCOAT DIVISION, P. O. Box

Reeves-Equipped Machines—Industry's Recognized "Cost Cutters"

VARIABLE SPEED TRANSMISSION (above) for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

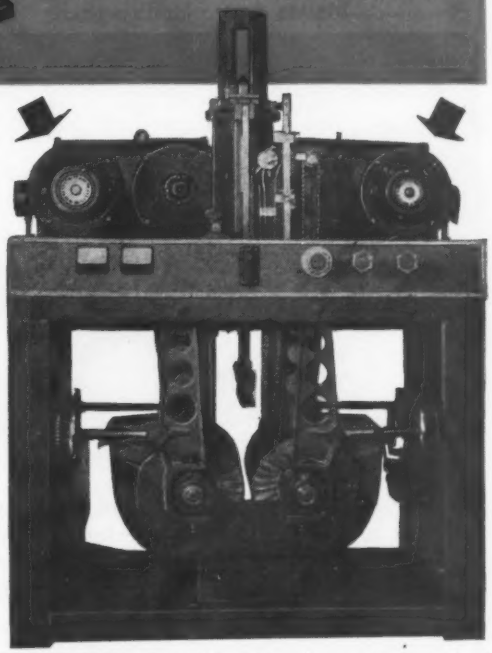
MOTODRIVE (below) combines motor, speed varying mechanism and reduction gears in single compact unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 15 hp.



VARI-SPEED MOTOR PULLEY (above) converts any standard constant speed motor to a variable speed drive within 4:1 ratio. Sizes to 15 hp.

Material, labor and other production costs may be up—but there is a brighter side: the day-after-day performance of machines equipped with REEVES Variable Speed Drives . . . Industry's recognized and proved "cost cutters." Providing infinite, stepless speed adjustability, REEVES Speed Control makes a machine more versatile . . . more productive . . . more profitable. Without "shut downs," it provides the right speed for every operator and every operation under every changing condition . . . assures uniform quality in greater quantity and at lower cost. Simply designed, ruggedly constructed, easy-to-maintain REEVES units are standard equipment on more than 2,100 different makes of machines . . . are easily installed on those already in service. So, to make sure that your machines, new and old, qualify as real "cost cutters" . . . make sure they are REEVES-equipped. For complete information, send for the 96-page catalog M-450.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA



Two REEVES Vari-Speed Motodrives (arrows) are standard equipment on this Nicholas Finishing Machine manufactured by Nicholas Equipment Company, Bellevue, O., and used for polishing and buffing cutlery. Use of the Motodrives makes it possible to synchronize the surface speed of both rolls and to select the exact speed required for each operation.

Accurate Variable
REEVES Speed Control
Gives the Right Speed for Every Job!

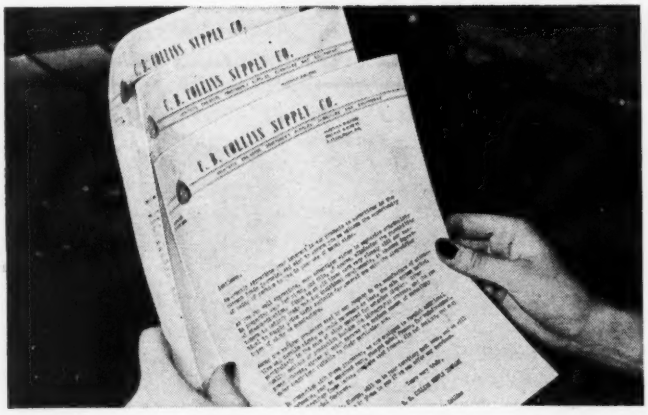
NOW... office work reproduced as fast as a draftsman's drawing!

9 seconds is all it takes to reproduce a draftsman's tracing as an easier-to-read positive (not negative) OZALID PRINT.

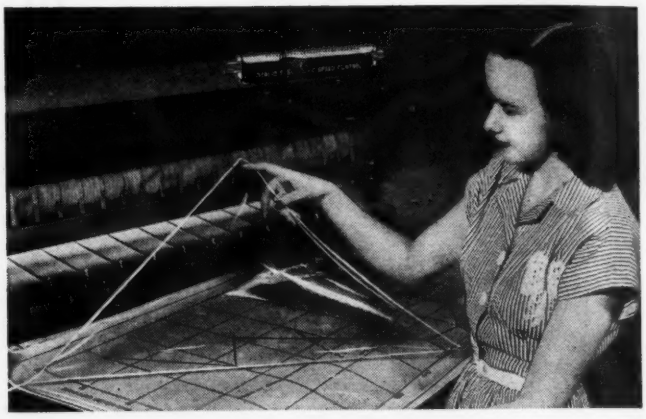
And using the *same* Ozalid machine, you have the *same* speed in reproducing your typed, printed, drawn, and photographic material.

Along with this, you enjoy Ozalid's unique versatility . . . being able to reproduce *any* translucent original as *any* one of 15 different types of Ozalid prints.

Check the savings in time, labor, and materials: You may now be using 4 other processes and still not be able to do the work Ozalid does—with truly amazing speed and economy.



1. No more repeat typing of form letters, reports, etc. Simply make Ozalid black-line prints like these from your original. Then fill in headings, references with same make of typewriter. Ozalid black-line prints exactly match original typing! Are completely dry, smudgeproof!



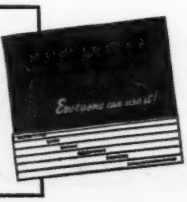
2. Five-color transparent overlays without printing plates or "Art" headaches. Separate black ink tracings are reproduced—each on Ozachrome film of desired color—black, blue, red, yellow, sepia. And the job is finished simply by stapling films together.

3. New business systems established. Your records can be duplicated in seconds on OZACARDS—tailored for your files. The fastest, most convenient, most economical way to relay information to various departments, branches, warehouses, etc.!

4. The only way to reproduce photographs in seconds. Beautiful OZALID DRYPHOTOS—with full tonal values—are produced directly from film positives. Keep film positives of your products on file, fill requests for "photos" as fast as received.

Learn all about this amazing new "graphic art" everyone can use . . . and see samples of the 15 types of Ozalid prints you can make. *Now available* are Ozalid machines for all production capacities.

Write today for *free* booklet No. **159.**



OZALID

DIVISION OF GENERAL ANILINE AND FILM CORPORATION
JOHNSON CITY, NEW YORK
Ozalid in Canada—Hughes Owens Co., Ltd., Montreal

3428 Terminal Annex, Los Angeles 54, Calif. Coating Comparison Chart, giving data on the properties and applications of the complete line of Amercoat plastic coatings. 14

Coolant Manual

OAKITE PRODUCTS INC., 26 Thames St., New York 6, N. Y. Manual describing the advantages and economies of Oakite soluble oil in machining, cutting, grinding, and related operations on ferrous and nonferrous metals. 15

Hydraulic Presses

WATSON-STILLMAN CO., Roselle, N. J. Bulletin 370-C containing complete specifications on the Watson-Stillman general-purpose 20- to 200-ton capacity hydraulic presses, designed to handle metal-working and plastic molding operations. 16

Salt-Bath Automatic Conveyor Equipment

A. F. Holden Co., New Haven 8, Conn. Treatise covering a simplified conveyor system for complete heat-treating processes for production parts, together with technical data on the various processes. 17

Die-Castings

DOEHLER-JARVIS CORPORATION, 386 Fourth Ave., New York 16, N. Y. Bulletin entitled "Another Difficult Problem Solved by Doehler-Jarvis Engineers," describing the application of die-casting in the production of an automatic pilot. 18

Sodium Hydride Descaling

AJAX ELECTRIC CO., INC., Frankford Ave. at Delaware Ave., Philadelphia 23, Pa. Reprints of articles entitled "Sodium Hydride Descaling" and "Sodium Hydride Descaling and Desanding of Ferrous Castings and Forgings."....19

Hydraulic Power Units

HYDRAULIC MACHINERY, INC., 12825 Ford Road, Dearborn, Mich. Bulletin descriptive of "Hy-Mac" hydraulic power units, suitable for application to new machines or for converting old machines to hydraulic power.....20

Disk Sanders and Saw Sharpeners

MAX MFG. CO., 138 Stockton Ave., San Jose 11, Calif. Leaflets illustrating and describing, respectively, Max universal 16-inch disk sanders for wood, metal, plastics, etc.; and the Acme circular saw sharpener...21

Automatic Lubrication System

RIVETT LATHE & GRINDER, INC., Lubrication Division, Brighton, Boston, Mass. Catalogue describing in detail the "Pulsolator," an automatic centralized oil lubricating system for machinery. 22

Hole-Locating Device

BULLARD CO., Bridgeport 2, Conn. Circular descriptive of the new "Man-Au-Trol" spacer for accurately positioning work for drilling, boring, reaming, or tapping operations without the use of jigs. 23

Lead-Measuring Instruments

FELLOWS GEAR SHAPER COMPANY, Springfield, Vt. Catalogue illustrating and describing the Fellows No. 12H lead-measuring instrument for checking the accuracy of helical and other surfaces. 24

Uni-Matic Lathe

MONARCH MACHINE TOOL CO., Sidney, Ohio. Bulletin 1701, illustrating and describing the Uni-Matic lathe, including electrical features and timing devices. Numerous machining set-ups are shown. 25

Broaching Machines

OILGEAR CO., 1312-P W. Bruce St., Milwaukee 4, Wis. Bulletin 25000, describing Oilgear Type XP vertical pull-down broaching machines and fixtures for internal and external broaching.....26

Diamond Tools

J. K. SMIT & SONS, INC., Department DT, 157 Chambers St., New York 7, N. Y. Catalogue on diamond tools, discussing factors to consider in buying these tools and giving other helpful information. 27

Hydraulic Equipment

HYDRO-POWER, INC., Belmont and Sheridan Aves., Springfield, Ohio. Bulletin 460, entitled "Hydraulics for Dependable Packaged Power," covering pumps, boosters, valves, and power units. 28

Carburizing Equipment

HEVI DUTY ELECTRIC CO., Milwaukee 1, Wis. Bulletin HD-646, descriptive of the Hevi Duty carburizer-nitrider furnace, including complete description of carburizing and nitriding procedure. 29

Electrodes

HOLLUP CORPORATION, DIVISION OF NATIONAL CYLINDER GAS CO., 4700 W. 19th St., Chicago 50, Ill. 64-page catalogue covering Hollup electrodes and National oxy-acetylene gas welding rods, together with welding procedures. 30

Lubrication of Diesel Engines

SUN OIL CO., Philadelphia 3, Pa. Technical bulletin B-1, containing complete information on the lubrication of Diesel engines, including lubricating oil recommendations and a "trouble shooting" chart. 31

Lubrication of Aircraft Wheel Bearings

TEXAS CO., 135 E. 42nd St., New York 17, N. Y. Bulletin on aircraft wheel bearing greases and their proper application. 32

Heavy-Duty Drills

CHICAGO-LATROBE TWIST DRILL WORKS, 411 W. Ontario St., Chicago 10, Ill. Circular containing specifications on Chicago-Latrobe high-speed heavy-duty twist drills. 33

Gear-Shaving Machines

NATIONAL BROACH & MACHINE CO., 5600 St. Jean, Detroit 13, Mich. Folder entitled "Shaving Greatly Facilitates Camshaft Gear Production." 34

Quick-Change Chucks and Collets

PROCUNIER SAFETY CHUCK CO., 16 S. Clinton St., Chicago 3, Ill. Pamphlet descriptive of Procunier quick-change chucks and collets. 35

New and Rebuilt Machine Tools

J. L. LUCAS & SON, INC., Bridgeport 5, Conn. Circular listing new and rebuilt machine tools available for immediate delivery. 36

Production Marking Equipment

IDEAL INDUSTRIES, INC., 1011 Park Ave., Sycamore, Ill. Circular descriptive of the new E-Z mark etcher for production marking of industrial products. 37

Turret Diamond-Holder

DIAMOND TOOL CO., 938 E. 41st St., Chicago, Ill. Circular descriptive of the new Booth three-angle turret diamond-holder for use in wheel dressing. 38

Tube-End Forming Equipment

VAILL ENGINEERING CO., 17 Brown St., Waterbury 89, Conn. General bulletin G-1, covering the complete line of Vaill tube-end forming equipment. 39

Micrometers

GEORGE SCHERR CO., INC., 199 Lafayette St., New York 12, N. Y. Folder on Scherr micrometers, formerly manufactured under the name of Reed. 40

Boring Tools and Accessories

FLYNN MFG. CO., 433 Bates St., Detroit 26, Mich. Catalogue covering the Flynn complete line of boring tools and accessories for toolroom and maintenance work. 41

Multiple Boring Machine

B. M. ROOT CO., York, Pa. Bulletin 71465, descriptive of the Root hydraulic-feed multiple borer for drilling rows of holes and similar operations in such materials as wood, plastics, metals, etc. 42

Cone Drives

MICHIGAN TOOL CO., 7171 E. McNichols Road, Detroit, Mich. Bulletin 789, on a new line of cone-drive gear sets, pinion and gear mountings, and speed reducers. 43

Portable Hydraulic Pipe-Benders

WATSON-STILLMAN CO., Roselle, N. J. Bulletin A-7, descriptive of the construction and operation of the Watson-Stillman portable hydraulic pipe-bender. 44

Colloidal Graphite

ACHESON COLLOIDS CORPORATION, Port Huron, Mich. Technical booklet on colloidal graphite and its use for lubrication and other purposes. 45

Coolant Filters

WILLIAM W. NUGENT & CO., INC., 410 N. Hermitage Ave., Chicago, Ill. Bulletin covering the use of both pressure and gravity filters for coolants and cutting oils. 46

Grinding Machines and Wheels

BRIDGEPORT SAFETY EMERY WHEEL CO., INC., Bridgeport, Conn. Catalogue 146, containing complete data on the company's line of grinding machines and grinding wheels.....47

Remote-Control Motor

TRANSICOIL CORPORATION, 114 Worth St., New York 13, N. Y. Circular descriptive of the new Transicoil "Servo-Motor" for remote-control applications. 48

Tool and Die Steels

KROPP FORGE CO., 5301 W. Roosevelt Road, Chicago 50, Ill. Bulletin 946, entitled "Specification Tool and Die Steels." 49

Carboloy-Tipped Cutting Tools

NELCO TOOL CO., INC., 370 Hamilton Ave., Brooklyn 31, N. Y. 28-page catalogue covering the Nelco line of Carboloy-tipped cutting tools. 50

Solder Wire

ALPHA METALS, INC., 359 Hudson Ave., Brooklyn 1, N. Y. Bulletin describing a new self-fluxing solder, known as "Tri-Core." 51

Angle Protractors

WILLEY'S CARBIDE TOOL CO., 1340 W. Vernor Highway, Detroit 1, Mich. Bulletin on Willey's new universal angle protractors. 52

Plastics

GENERAL ELECTRIC CO., Pittsfield, Mass. Booklet entitled "Twenty-Four Case Histories—How Plastics Solved War Problems." 53

Air Cylinders

OAKLAND ENGINEERING CO., INC., 800 One-hundredth Ave., Oakland 3, Calif. Catalogue on the Oakland line of air cylinders.....54

Metal Bending and Punching Calculator

Designed to aid in solving forming and punching problems for the sheet-metal industry, a new bending and punching calculator has been made available to shop supervisors, engineers, and executives in metalworking plants. A simple turn of the wheel gives the die opening and press capacity required for making 90-degree bends in mild steel and stainless steel of all commonly used gages.

For punching operations, the calculator indicates the tons per hole required to punch holes of eight different sizes in mild steel plate of a wide variety of gages.

The calculator can be obtained free of charge by addressing the Verson Allsteel Press Co., 1355 E. 93rd St., Chicago 19, Ill.

* * *

Machine Tool Manufacturers Attend Paris Fair

Societe Anonyme R. S. Stokvis & Fils, Paris, France, recently entertained a number of American, British, Swiss, and Belgian machine tool manufacturers, for which that company is agent, in connection with the recent Paris Fair, which is the first to be held since the liberation of France. J. Peskine, managing director of Stokvis & Fils, invited representatives of several manufacturers to visit the Fair and to attend an informal dinner party. Among the guests were Messrs. Clark and Urban of the Warner & Swasey Co., Dolle of the Lodge & Shipley Machine Tool Co., Martin of the Landis Tool Co., Eserkaln of the George Gorton Machine Co., and Rademacher of the Stokerunit Corporation.

To Obtain Copies of New Trade Literature

listed in this section (without charge or obligation), fill in below the publications wanted, using the identifying number at the end of each descriptive paragraph; detach and mail within three months of the date of this issue (October, 1946) to MACHINERY, 148 Lafayette Street, New York 13, N. Y.

No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

NAME.....POSITION OR TITLE.....

[This service is for those in charge of shop and engineering work in manufacturing plants.]

FIRM.....

BUSINESS ADDRESS.....

CITY.....STATE.....

Fine Finish AT 400 S.F.P.M.

SUNICUT...

Eliminates Chatter Marks and Poor Finish, Cuts Down Rejects

A precision manufacturer was turning, boring, and threading small precision parts on Gridley automatics. Accuracy varied. Chatter marks frequently marred the work, and threads were poor. Rejects were too high.

Here are the facts:

Type of Machine: National Acme Gridley Automatic Screw Machine; 2⅝" capacity; Model R.B.; Six Spindles

Material Machined: Commercial Rod Brass

Speed: 400 Surface-Feet per Minute
Feed: .003"

Lubricant: Sunicut

A change to Sunicut was recommended by a Sun Cutting Oil Engineer. Chatter marks disappeared. Tolerances were maintained. Better threads were made possible, and rejects diminished, resulting in increased production.

The selection and proper application of the right oil always insure top performance. Test Sunicut in your own shop. It is a clear, transparent, sulphurized cutting oil, designed for high accuracy at high speeds on tough jobs.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

Sponsors of the Sunoco News-Voice of the Air — Lowell Thomas

SUN

SUNOCO

INDUSTRIAL PRODUCTS

SHELL HYDRAULIC OIL STOPS VALVE STICKING

PROBLEM: Valves were sticking in the hydraulic control system of an automatic boring machine. Lacquer and gum formations were clearly responsible, but operators could find no way to stop it. Cleaning the system once and sometimes twice each week seemed to be the only way to keep the unit in service.

SOLUTION: When the Shell Lubrication Engineer surveyed the problem, he made two recommendations:

1. A thorough cleaning of the system, following a procedure and using special materials developed by Shell.
2. The use of a Shell Tellus Oil, one of several Shell hydraulic oils specially refined to retard oxidation and rusting.

At the end of two months, no sign of valve sticking had occurred. The operators were reported to be completely satisfied.

CONCLUSION: It pays to consult the Shell Lubrication Engineer, regardless of the nature or size of your lubricating problem. For informative literature on Hydraulic Oils, write Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, New York or 100 Bush Street, San Francisco 6, California.

SHELL HYDRAULIC OILS

SHELL

SYNCHRONOUS MOTOR "TROUBLE-SHOOTING" CHART—3

Trouble	Cause	Remedy
Motor "hunts"	Fluctuating load	Correct excessive torque peak at driven machine or consult motor manufacturer. If driven machine is a compressor, check valve operations. Increase or decrease flywheel size. Try decreasing or increasing motor field current.
Stator overheats in spots	Rotor not centered	Realign and shim stator or bearings.
	Open phase	Check connections and correct.
	Unbalanced currents	Check for loose connections; check for improper internal connections.
One or more coils overheat	Short circuit	Cut out coil as expedient (in motors up to 5 H.P.); replace coil when the opportunity arises.
Field overheats	Short circuit in a field coil	Replace or repair.
	Excessive field current	Reduce excitation until stator current is at nameplate value.
All parts overheat	Overload	Reduce load or increase motor size. Check friction and belt tension, or alignment.
	Over or under excitation	Adjust excitation to nameplate rating.
	No field excitation	Check circuit and exciter.
	Reverse field coil	Check polarity, and if wrong, change leads.
	Improper voltage	See that nameplate voltage is applied.
	Improper ventilation	Remove any obstruction and clean out dirt.
	Excessive room temperature	Supply cooler air.

MACHINERY'S Data Sheet No. 571, October, 1946

Compiled by the General Electric Co.
Schenectady, N. Y.

SOME COMMON GEAR DIFFICULTIES AND HOW TO OVERCOME THEM

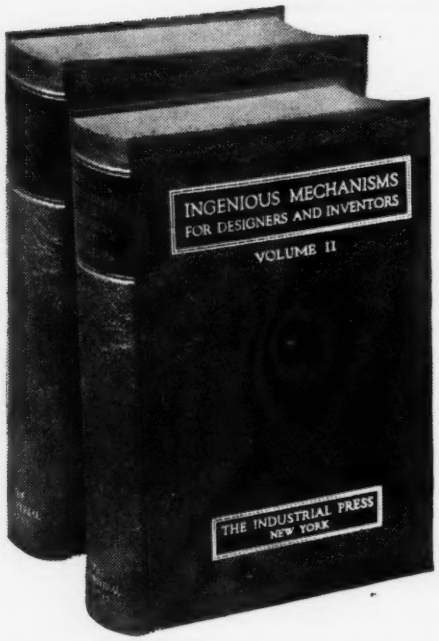
Some of the Troubles to be Overcome	Gears Most Subject to Trouble	Cause	Method of Correcting
Abrasive Wear or Scoring	Spur, Helical, and Bevel Gears	Misalignment or rough surfaces; improper tooth contact; sliding under heavy load; too low oil viscosity; low starting temperatures	Increase oil viscosity; use oil with mild non-corrosive E.P. additive; use means for preheating to raise the starting temperature.
Galling	Spiral, Bevel, and Hypoid Gears	Oil-film rupture; high surface temperatures	Use oil with mild non-corrosive E.P. additive; use means for cooling to reduce temperatures.
Pitting	Any or All Types of Gears	Occurs with rolling, as well as with combined rolling and sliding, when oil is too low in viscosity. More prevalent on rough surface finishes or where local tooth overload prevails	Use an E.P. oil; increase the oil viscosity; try to get gears of better surface finish; increase the surface hardness or metal toughness. Improve tooth alignment and load uniformity by shimming under bearings or adding outboard bearings to overhung pinions.
Burning	Any or All Types of Gears	Overload or lack of lubrication	Run under conditions for which gear was designed. Lubricate.

MACHINERY'S Data Sheet No. 572, October, 1946

Compiled by The Texas Company
New York 17, N. Y.

Ingenious Mechanisms for Designers and Inventors

Two Books that Form a Complete Course of Study



To own these two volumes, that form a complete course of study, is to have a comprehensive encyclopedia of mechanical movements unparalleled in scope and usefulness. Each volume is an entirely independent treatise on mechanisms; both books are similar in size and general character, but the contents are different.

Every mechanism described and illustrated embodies some idea or principle likely to prove useful to designers or inventors. Volume I contains 536 pages and 300 illustrations; Volume II, 538 pages and 303 illustrations. Price, $8 set or $5 for either book separately.

THE INDUSTRIAL PRESS, 148 Lafayette Street, New York 13, N. Y.

Gear Design Simplified

Size 8-1/2 x 11 Inches

This book of working rules and formulas for designer and shop man, deals with spur gears, internal gears, straight-tooth and spiral-bevel gears, single- and double-helical gears, worm-gears, gear ratios (including transmissions of the planetary type) and the power-transmitting capacity of gears.

All gear problems are presented in simple chart form. These 110 charts, with 201 drawings illustrating all kinds of gear problems, are easy to use and you can locate quickly whatever rule or formula is desired. Worked-out examples of gear design show exactly how all rules (or the formulas, if preferred) are actually applied in obtaining the essential dimensions, angles, or other values. Price $3 copy.

THE INDUSTRIAL PRESS, 148 Lafayette Street, New York 13, N. Y.

Scrap Metal Drive of Automobile Industry

Automobile manufacturers have recently notified their more than 35,000 dealers throughout the country that automotive production is being held down to an important extent by the limited supply of steel, and that it will be further decreased unless there is an immediate and substantial increase in the collection of scrap metal. Dealers have been urged to turn in every bit of scrap metal they can find in their establishments as the industry starts an intensive drive to increase the flow of scrap to steel mills and foundries. The current need for scrap metal to keep automotive production going is said to be as urgent as it was during the war years for military output.

The appeals for scrap listed such sources of scrap cast iron as transmission cases, cylinder blocks, cylinder heads, manifolds, and camshafts, and pointed out that there is valuable steel scrap available in frames, crankshafts, wheels, axles, and bodies. Discarded batteries should yield much needed lead, and old radiator cores, copper and brass.

* * *

A great many people think of advances in engineering, chemistry, and other sciences solely in terms of industrial progress. Actually, the influence of this progress is more far-reaching in its effect on social, economic, and political changes. Technological progress has completely altered the course of human lives and created entirely new problems in every field of human endeavor.

Suggestion System that Has Produced Real Benefits to Both Employes and Company

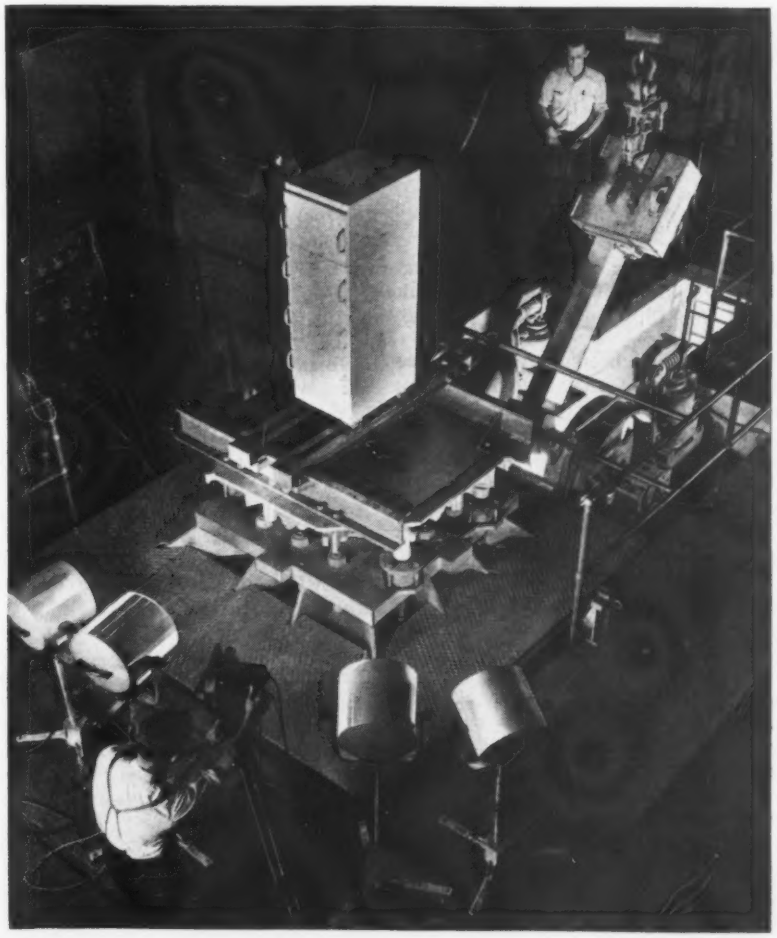
A cash award of $2030—the highest ever paid an employe of the General Electric Co. under its forty-year-old suggestion system — has been made to Richard Musgrove, a winder in the distribution transformer winding and insulation section of the General Electric Pittsfield Works. Mr. Musgrove's suggestion resulted in a marked saving of materials. Last January he was awarded $1530 for a suggested change in the method of making the connection between the inner and outer secondary coils on certain types of distribution transformers. He has now received an additional $500 because of a wider application in the company's work of his original suggestion, making his total award $2030.

Under the General Electric suggestion system, whereby employes are awarded cash amounts for ideas on improving plant and office operations, nearly $2,000,000 has been paid to employes since the system was reorganized in 1922. The company's highest previous award was made in 1945 to Orvar N. Ericson, General Electric toolmaker for more than twenty-three years, who received $2000 for an idea which speeded the final production of a new remote control gunnery system used on the B-29 Superfortress.

* * *

Twenty-Fifth Anniversary of Dayton Rogers Mfg. Co.

The Dayton Rogers Mfg. Co., Minneapolis, Minn., manufacturer of metal stampings, is celebrating this year the twenty-fifth anniversary of the founding of the company. In 1921, Dayton A. Rogers started the production of die-cut metal stampings in small lots. Through the years the company has steadily expanded until it now occupies a building containing 75,000 square feet of floor space and employs over 350 people. It is still under the leadership of the founder, Mr. Rogers, who is president of the company. In the last few years the company has developed a complete line of pneumatic die cushions.



High-speed Moving Pictures are Made of Electrical Apparatus as it Undergoes a 5500 Foot-pound Shock Test at the Westinghouse Electric Corporation, Pittsburgh, Pa. The 3000-pound Hammer in the Rear Swings through an Arc and Strikes the Under Side of the Platform on which the Cabinet is Bolted, thereby Imparting a Terrific Impact. When the Films, which are Taken at 4500 Feet per Second, are Projected at 16 Feet per Second, Engineers Have Ample Time to Study the Reaction of the Cabinet and Analyze Failures Resulting from Shock

News of the Industry

California

T. L. KISHBAUGH has become associated with the new Los Angeles plant of Joseph T. Ryerson & Son, Inc., Chicago, Ill., which it is expected will be placed in operation some time this fall.

Illinois

WALTER B. BRIGGS, formerly manager of the Power Transmission Division of Ideal Industries, Inc., has been appointed general manager of the Power Transmission Division of Lovejoy Flexible Coupling Co., Chicago 44, Ill.

Walter B. Briggs, General Manager, Power Transmission Division, Lovejoy Flexible Coupling Co.

R. H. GETZ has been appointed representative in the Chicago territory for BARDONS & OLIVER, INC., Cleveland 13, Ohio. Mr. Getz's office is located in the Machinery Sales Bldg., 565 W. Washington Blvd., Chicago, Ill. Mr. Getz was connected for nearly eight years with the Vandyck Churchill Co., New York City, in a selling capacity, and prior to that was associated with his father, A. C. Getz, at the Sidney Machine Tool Co., Sidney, Ohio, which was founded by him.

TACO WEST CORPORATION, 2620 S. Park Ave., Chicago, Ill., is a new company formed to manufacture and market automatic electronic control devices in the field of combustion control, gas analysis, pyrometry, process control, and allied apparatus. The president of the company is THEODORE A. COHEN, and the secretary-treasurer RICHARD K. WEST.

RICHARD W. MILLER has been appointed district sales manager in charge of the Chicago office of the Columbia Tool Steel Co. Mr. Miller has been with the company since 1929, and was previously assistant manager at Cleveland. He will have offices at 326-328 N. Western Ave., Chicago, Ill.

BARNES & REINECKE, INC., Chicago, Ill., industrial designers and engineers, have purchased the SHOBERG TOOL CO. of Chicago, manufacturer of precision tools, instruments, and machines. FRED P. SHOBERG will continue as president of the company, which will be conducted as a division of Barnes & Reinecke.

CLARENCE H. COLLIER, JR., has been appointed manager of the Industrial Lift Truck Eastern Division of the Hyster Co., Portland, Ore. Mr. Collier will make his headquarters in Peoria, Ill.

Maryland and Delaware

GEARY STAINLESS STEEL CO., 15 E. 21st St., Baltimore 18, Md., has appointed WILLIAM R. THOMPSON, 75 Lemoyne Ave., Washington, Pa., district manager for western Pennsylvania, and EDWARD G. CRESSELL, 333 N. Michigan Ave., Chicago, Ill., district manager for Illinois, Indiana, and southwestern Michigan.

J. P. MARTEL has been appointed manager of the Design Division, Engineering Department of the E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., succeeding MELVIN F. WOOD, who has become assistant chief engineer of the company.

Michigan and Wisconsin

JOHN W. MIGHTON and RAY H. MCLEOD, recently released from the U. S. Navy, have joined the sales staff of the Dow Chemical Co., Midland, Mich. Mr. Mighton is located at the main plant in Michigan, and Mr. McLeod in Chicago. HOWARD P. ATKIN, after serving four years with the Army Air Corps, has joined the sales staff of the company, and will make his headquarters at Los Angeles, Calif.

BERT CARPENTER CO., 208 Hanna Bldg., Birmingham, Mich., has been appointed exclusive representative in eastern Michigan and northern Ohio for the FERRACUTE MACHINE CO., Bridgeton, N.J., manufacturer of power presses and special sheet-metal machinery.

HOWARD J. WARD has been appointed district manager for the Udylite Corporation, Detroit 11, Mich., in the Michigan territory. Mr. Ward has been with the corporation for the last ten years. He replaces WILLIAM H. ROSS, who recently resigned.

D. A. NABB has been appointed assistant sales manager of the Detroit Seamless Steel Tubes Co., Detroit, Mich. He has been associated with the sales department of the company since November, 1945.

D. E. MCGUIRE, assistant to the general works manager of the Great Lakes Steel Corporation, Ecorse, Detroit, Mich., has been appointed chief engineer.

ALLEN W. LOVELL, formerly sales manager of the Modern Collet & Machine Co., Ecorse, Mich., has been appointed general manager. HENRY HILLERMAN becomes sales manager.

J. DONALD ZAISER has been elected president and general manager of Ampco Metal, Inc., Milwaukee, Wis., succeeding his father, C. J. Zaiser, who passed away recently. The new president has been associated with the company since 1933, when he graduated from Purdue University with the degree of mechanical engineer. He started in the production department of the company, and a year later was transferred to the field sales department, of which he became manager in 1936. About two years later Mr. Zaiser was made general sales manager, advancing successively to the posts of vice-president and assistant general manager, executive vice-president, and general manager.

J. Donald Zaiser, Newly Elected President and General Manager, Ampco Metal, Inc.

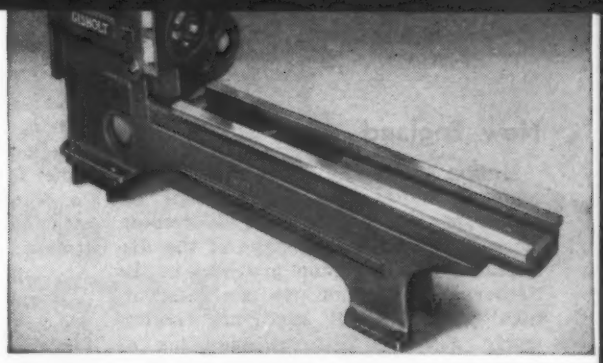
how RIGIDITY preserves ACCURACY

Here are two good reasons why you can count on the accuracy of Gisholt Turret Lathes—now and years from now.

One-piece bed and headstock, cast as a heavy, rigid unit, reduce distortion and vibration to a minimum. Headstock is jig-bored to insure—and *maintain*—perfect alignment of spindle and drive shafts, with ample metal to provide the most solid support possible.

Hardened steel ways are augmented by hardened steel strips secured to the ram saddle, as well as hardened steel gibs and clamps, making an assembly that is virtually wear-proof. Its accuracy is further preserved by force lubrication.

These advantages are yours for the long life of any Gisholt Turret Lathe. Ask for complete details.



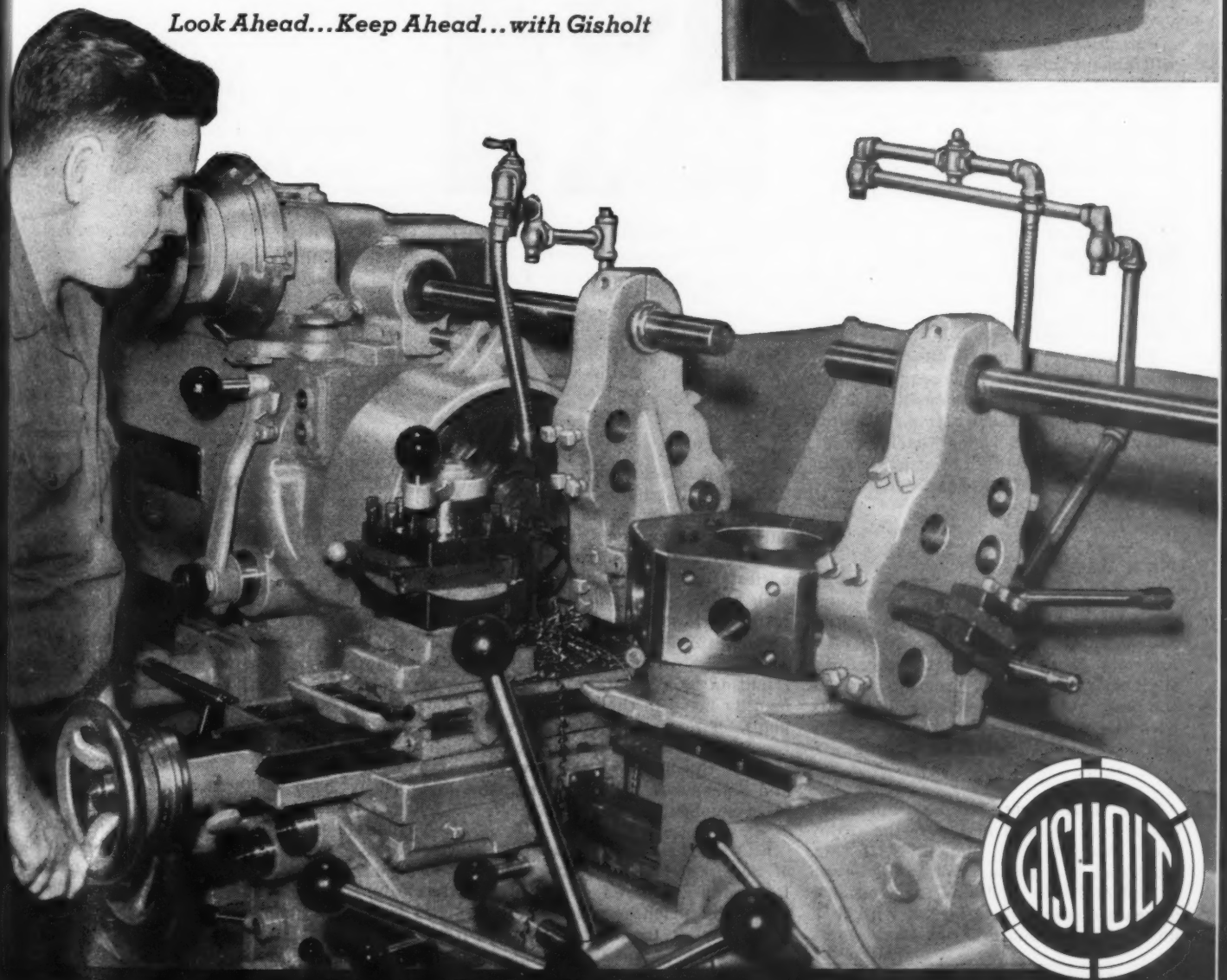
Above: *Bed and Headstock are cast integrally to form an extremely heavy unit and to provide the rigid foundation for all types of work.*

Below: *Solid block type ways are straddle keyed to the bed and ground in perfect alignment with the spindle. All working surfaces are hardened to 64-66 Rockwell "C".*

GISHOLT MACHINE COMPANY

1209 E. Washington Ave. • Madison 3, Wis.

Look Ahead...Keep Ahead...with Gisholt



TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINE

New England

MICHEL BISCAYART has been appointed regional manager of the Foreign Division of the Norton Co., Worcester, Mass., and will have charge of the distribution of all Norton products in the Netherlands, Belgium, Switzerland, Portugal and Spain. Mr. Biscayart was formerly assistant general manager of Compagnie des Meules Norton—the Norton branch factory in France—and will continue to make his headquarters in that country.

CRESCENT CORPORATION, Fall River, Mass., announces that it has acquired all the shares of capital stock of the POTTER & JOHNSTON MACHINE CO., Pawtucket, R. I., manufacturer of automatic turret lathes. The new officers of the company are JACOB ZISKIND, president; J. EARLE MAKANT, vice-president in charge of plant operations; J. POTTER CUNNINGHAM, vice-president in charge of sales; and NORMAN R. EARLE, vice-president.

CARBOLOY COMPANY, INC., Detroit, Mich., has appointed the ARTHUR A. CRAFTS CO., INC., 603 Newbury St., Boston 15, Mass., distributor for the hard metal carbide products of the company.

AMERICAN SCREW CO., Providence, R. I., will shortly move into its new modern plant at Willimantic, Conn. The company will continue to operate a plant in Providence, where it has been located for the last 108 years, but the new air-conditioned plant in Willimantic will be the main production center. At first about 500 people will be employed, but it is expected eventually to raise this figure to 1500. The new premises cover a total of 87 acres, and the brick and concrete buildings contain nearly 400,000 square feet of floor space.

KENNETH F. THOMAS has been appointed district engineer for the New England office of the Kaydon Engineering Corporation, Muskegon, Mich., manufacturer of ball and roller bearings. Mr. Thomas' headquarters are at 62 La Salle Road, West Hartford, Conn.

New Jersey

A. D. ANDRIOLA has been appointed chief research engineer of the De Laval Steam Turbine Co., Trenton, N. J. Mr. Andriola heads the recently organized engineering research program of the company, which is concerned mainly with the development of turbines, compressors, pumps, and marine and aircraft units.

EMIL G. HOLMBERG has been appointed consulting metallurgist for the Alloy Steel Products Co., Linden, N. J. Mr. Holmberg is a graduate of the Colorado School of Mines, and was for a number of years research metallurgist with E. I. du Pont de Nemours & Co., Inc.

P. L. CODDINGTON has been appointed manager of sales for the Welded Alloy Tube Division of the Carpenter Steel Co., Kenilworth, N. J. J. A. DIETRICH has been named assistant manager of the division.

New York

J. C. LEONARD has been appointed sales manager of the Industrial Marketing Division of Oakite Products, Inc., 22 Thames St., New York 6, N. Y. Mr. Leonard has been associated with the Oakite organization for over twenty-two years, the last sixteen of which he has been manager of the Chicago division. He will make his headquarters at the general offices in New York.

J. C. Leonard, Newly Appointed Sales Manager, Industrial Marketing Division, Oakite Products

RUDEL-CAREY, INC., a concern that was organized last spring to act as sales engineering distributor in the New York metropolitan area for high-speed and carbide cutting tools, grinding wheels, machine tool attachments and accessories, light machine tools, and materials-handling equipment, announces that it is now established in its new quarters at 435 Fourth Ave., New York 16, N. Y. The company has completed distribution agreements with a number of leading firms in the machinery and tool fields. THOMAS R. RUDEL, president of the Rudel Machinery Co., Inc., is chairman of the board of the new company, and ANDREW G. CAREY is president and sales manager.

C. VAN HOOYDONK, managing director of Saarloos' Handelmaatschappij N. V., Rotterdam, Holland, dealers and importers of machinery and tools is planning to visit the United States with a view to renewing acquaintances and making new business contacts with manufacturers in the automotive and machinery industries. Mr. Van Hooydonk expects to arrive in New York on about October 13 and will remain until December. While in this country, his address will be Care of MACHINERY, 148 Lafayette St., New York 13, N. Y.

LAKE ERIE ENGINEERING CORPORATION, Buffalo, N. Y., manufacturer of hydraulic presses and special machinery, has taken over the FELLER ENGINEERING CO., Pittsburgh, Pa., manufacturer of hydraulic extrusion presses. The activities of the latter company will be carried on as the Feller Engineering Division of the Lake Erie Engineering Co., with K. Feller as general manager. Mr. Feller's headquarters will be in the Empire Bldg., Pittsburgh, Pa.

E. A. TICE has joined the corrosion engineering section of the Development and Research Division of the International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. D. A. NEMSER, head of the New England field section of the division, recently addressed the Springfield Chapter of the American Society for Metals on the "Effect of Structure on Machining Steels."

PENFLEX SALES CO. DIVISION OF PENNSYLVANIA FLEXIBLE METALLIC TUBING CO., Philadelphia, Pa., has opened on office at 108 W. Jefferson St., Syracuse, N. Y., with WILLIAM V. PYNDUS in charge.

CRUCIBLE STEEL CO. OF AMERICA has moved the offices and facilities of the New York branch to 650-652 E. 12th St., New York 9, N. Y. HAROLD BARLOW is manager of the New York office.

PENNSON CORPORATION of New York City and Waltham, Mass., has purchased the MCINTYRE CO., Newton, Mass., manufacturer of high-precision industrial hydraulic and water pumps and fluid motors.

JOHN O. FORSTER has been appointed chief engineer of Aircraft Screw Products Co., Inc., Long Island City, N. Y., manufacturer of screw-thread inserts.

North Carolina and Kentucky

ALEXANDER B. ANDREWS, JR., Insurance Bldg., Raleigh, N. C., has been appointed engineering representative in North and South Carolina for the Kropp Forge Co., Chicago, Ill., manufacturer of flat die, drop, and upset forgings.

ACME BROACH CORPORATION has recently been established at E. 3rd St. and Delaware, Lexington 21, Ky., to manufacture broaching machines and tools. The executive vice-president of the company is FRANCIS J. LAPOINTE, who has been associated with the broaching field for the last forty-four years.

J&L has developed Jalloy steel especially for use in forged and heat treated parts. It provides exceptional response to heat treatment. Jalloy may be depended upon for its uniform deep hardening characteristics. It also has excellent ductility and toughness in the quenched and tempered condition. Jalloy is the steel for use where high dynamic stresses are involved. Our metallurgists will be glad to discuss the unusual properties of Jalloy with you. Write for further information.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Ohio

J. HUBERT CUNI has been made personnel director of the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio. Mr. Cuni was associated with Aluminum Industries, Inc., from 1932 up to August

J. Hubert Cuni, Personnel Director of Lodge & Shipley Machine Tool Co.

of this year, with the exception of three years' service in the Navy during the war. He is a past-president of the Cincinnati Employment Managers Club.

SHEFFIELD CORPORATION, Dayton, Ohio, has purchased the plant, equipment, and business of the THREADWELL TAP & DIE Co., Greenfield, Mass. No changes will be made in the Threadwell organization, and the personnel remains the same, Herbert J. Smith, continuing as president. The Sheffield Corporation has four main divisions, three of which are devoted to the manufacturer of gages, precision measuring instruments, and machine tools, respectively; the fourth provides a contract engineering and manufacturing service for other industries. The acquisition of the Threadwell Tap & Die Co. will make possible a further expansion of the corporation's service.

MONARCH MACHINE TOOL CO., Sidney, Ohio, has been granted an exclusive license by the BAILEY METER CO., Cleveland, Ohio, to build and market in the machine tool field a contour turning mechanism developed by the latter company. These contour controls will be applied immediately to the 14-, 16-, 18-, and 20-inch Monarch lathes; and other applications will follow.

LEES-BRADNER CO., Cleveland 11, Ohio, has recently appointed the following distributors for its products: BURLEIGH-STOCKER MACHINERY CO., 1914 Fisher Bldg., Detroit 2, Mich.; GOLDEN & MCCOY MACHINERY CO., Rockefeller Bldg., Cleveland 13, Ohio; and LYND-FARQUHAR CO., Park Square Bldg., Boston, Mass.

GRAY L. FUREY, 405 Union Central Bldg., Cincinnati, Ohio, has been appointed sales representative in Kentucky, southwestern Ohio, and eastern Indiana for the TITAN METAL MFG. CO., Bellefonte, Pa., manufacturer of brass and bronze rods, forgings, die-castings, and welding rods.

SPICER MFG. CORPORATION, Toledo, Ohio, manufacturer of automotive power transmission equipment and railway generator drives, recently changed the name of the company to SPICER MFG. DIVISION OF THE DANA CORPORATION. This does not involve any change in the organization or its affiliated companies.

ASTOR L. THURMAN has been appointed assistant to the vice-president of the Aetna-Standard Engineering Co., Youngstown, Ohio. He was previously chief electrical engineer of the company. JAMES RIDDELL will succeed Mr. Thurman as chief electrical engineer.

HARVEY P. BARNES, 345 E. 218th St., Euclid, Ohio, has been appointed sales engineer in the Cleveland and northern Ohio territory for the Hannifin Mfg. Co., Chicago 24, Ill.. maker of pneumatic and hydraulic production equipment.

ERNEST S. THEISS has been appointed assistant chief engineer of the Davey Compressor Co., Kent, Ohio. For the last seven years, Mr. Theiss has been assistant professor in the Mechanical Engineering Department of the College of Engineering, Duke University.

J. W. LEROY has been made manager of special products sales for the Berger Manufacturing Division of the Republic Steel Corporation, Canton, Ohio. He was previously sales engineer in the special products department.

LANDIS TOOL CO., Waynesboro, Pa., has opened a new office at 3091 Mayfield Road, Cleveland 18, Ohio, with P. E. BEAVER as manager. Mr. Beaver was previously connected with the Chicago office.

JAMES E. ALLEN, vice-president of the Aro Equipment Corporation, Bryan, Ohio, was elected to the office of executive vice-president at a recent meeting of the board of directors.

EAST SHORE MACHINE PRODUCTS CO., 835 E. 140th St., Cleveland 10, Ohio, has acquired the tool and surface plate business of STATE MFG. & CONSTRUCTION CO., Franklin, Ohio.

Oklahoma and Texas

ROBERT DUENNER & CO., Tulsa, Okla., have been named sales representatives for the LUKENS STEEL CO., Coatesville, Pa., and its subsidiaries BY-PRODUCTS STEEL CORPORATION and LUKENWELD, INC. The Duenner organization will represent the three companies in Oklahoma, Kansas, Colorado, and part of Missouri.

GENERAL ELECTRIC CO., Schenectady, N. Y., announces the opening of a new branch of the Electric Welding Division in Houston, Tex., which will handle the complete line of G-E arc-welding products. F. C. NEAL, JR., is manager of the new branch.

Pennsylvania

KENNAMETAL, INC., Latrobe, Pa., has appointed BENNETT BURGOON district manager of the new central district, which is a consolidation of the former Detroit and Cleveland Kennametal sales districts. He will have headquarters at 5531 Woodward Ave., Detroit 2, Mich. The H & H TOOL & SUPPLY CO., 211 N. Broadway, Wichita 2, Kan., has been appointed selling agent for the Wichita area. THOMAS O'CONNELL has been appointed agent for the South Atlantic district, which consists of North Carolina and parts of South Carolina, Georgia, Tennessee, Kentucky, and Virginia. He will have offices in the McIntyre Bldg., Asheville, N. C. ALFRED A. ANDERSON has been placed in charge of the Baltimore office, recently opened. His address is North Rolling Road and Powers Lane, Catonsville 23, Md.

HARRY A. TRISHMAN has been appointed manager of the Hydraulic Division of the Erie Foundry Co., Erie, Pa., and will have charge of the development of the company's line of hydraulic presses and other heavy equipment for processing rubber, plastics, and sheet metal. Mr. Trishman was connected for twenty-five years with the Adamson United Co. in the capacity of chief engineer.

Harry A. Trishman, Manager of the Hydraulic Division, Erie Foundry Co.

$3000.00
AND WORTH A LOT MORE!
• UP TO 50-100 TIMES AS MUCH STRIP ROLLED BETWEEN GRINDS
• RECONDITIONING REQUIRES LESS STOCK REMOVAL
• INCREASED PRODUCTION DUE TO LESS DOWN TIME
• GREATER REDUCTION PER PASS IF WORK PERMITS
• SUPERIOR PRODUCT, ACCURATE GAGE, BETTER FINISH

A pair of solid Kennametal Rolls, 3" diameter, 8½" face, for cold rolling of steel.

The Savings Thus Effected Have Paid For The Cost of Kennametal Rolls in A Very Short Time!

Kennametal Rolls are amazingly hard (78 Rockwell C compared to 66 for hardest tool steel)—*high resistance to abrasion.* Modulus of elasticity is 2 to 3 times that of steel—*greater rigidity under load.* Structure is dense and uniform—*can be given long-lasting, mirror-like finish.* Contain $WTiC_2$—*greater resistance to galling than steel or tungsten carbide rolls.* This distinctive intermetallic compound (tungsten-titanium carbide), is the same ingredient that has made Kennametal outstanding in metal-working industries because it effectively resists the "cratering" action of steel chips, and therefore greatly lengthens tool life.

Kennametal Rolls are made to order, and can be produced in sizes up to 6" diameter, 40" length.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
TRADE-MARK REG. U. S. PAT. OFF.
KENNAMETAL Inc., LATROBE, PA.

VOSS MACHINERY CO., 2882 W. Liberty Ave., Pittsburgh, Pa., has been appointed exclusive representative for the THRIFT-MASTER PRODUCTS DIVISION OF THOMSON INDUSTRIES, INC., New York, N. Y., and will engineer and service Thriftmaster multiple-spindle drill heads in the western Pennsylvania, West Virginia, eastern Ohio, and western Maryland area.

ALLEGHENY LUDLUM STEEL CORPORATION, Pittsburgh, Pa., announces the consolidation of its Sales Development and Engineering Service Divisions under the management of W. B. PIERCE. Mr. Pierce was formerly manager of the Sales Development Division.

QUENTIN D. MEHRKAM, formerly production metallurgist for the Thompson Products Co., Cleveland, Ohio, has recently joined the metallurgical staff of the Ajax Electric Co., Inc., Philadelphia, Pa., manufacturer of electric salt bath furnaces.

ROCKWELL MFG. CO., Pittsburgh, Pa., announces the organization of a new Hydraulics Division which will specialize in the development of hydraulic equipment. W. H. MARSH will be general manager of the new division.

I. B. ANDERSON has been appointed manager of the Stainless Steel Division of the Jessop Steel Co., Washington, Pa.

Coming Events

OCTOBER 3-5 — Aeronautic Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Biltmore Hotel, Los Angeles, Calif. John A. C. Warner, secretary and general manager, 29 W. 39th St., New York 18, N. Y.

OCTOBER 3-5 — NATIONAL ELECTRONICS CONFERENCE at the Edgewater Beach Hotel, Chicago, Ill. For further information, address E. H. Schulz, secretary, National Electronics Conference, Technology Center, Chicago 16, Ill.

OCTOBER 8-9—Conference on Industrial Relations, sponsored by the AMERICAN MANAGEMENT ASSOCIATION, at the Hotel Statler, Boston. For further information, address the Association at 330 W. 42nd St., New York 18, N. Y.

OCTOBER 10-12 — Semi-annual meeting of the AMERICAN SOCIETY OF TOOL ENGINEERS at the William Penn Hotel, Pittsburgh, Pa. H. E. Conrad, executive secretary, 1666 Penobscot Bldg., Detroit 26, Mich.

OCTOBER 15-25 — An intensive ten-day course in QUALITY CONTROL BY STATISTICAL METHODS, at the COLLEGE OF ENGINEERING, UNIVERSITY OF IOWA, Iowa City, Iowa. For further information, address Professor Earle L. Waterman at the University of Iowa.

OCTOBER 16-17 — National Transportation and Maintenance Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Hotel Knickerbocker, Chicago, Ill. Secretary and general manager, John A. C. Warner, 29 W. 39th St., New York 18, N. Y.

OCTOBER 17-18—Annual meeting of the New England section of the SOCIETY OF THE PLASTICS INDUSTRY, INC., at Equinox House, Manchester, Vt. Further information can be obtained from the Society, 295 Madison Ave., New York 17, N. Y.

OCTOBER 22-23—NATIONAL CONFERENCE ON HYDRAULIC MACHINERY at the Hotel Continental, 505 N. Michigan Ave., Chicago, Ill., sponsored by the Illinois Institute of Technology, with the cooperation of the Western Society of Engineers and local sections of the A.S.C.E., A.S.M.E., and S.A.E.

OCTOBER 23-26—Meeting of the NATIONAL TOOL AND DIE MANUFACTURERS ASSOCIATION at the Congress Hotel, Chicago, Ill. For further information, address the Association headquarters, 1412 Union Commerce Bldg., Cleveland 14, Ohio.

OCTOBER 28-30 — Semi-annual meeting of the AMERICAN GEAR MANUFACTURERS ASSOCIATION at the Edgewater Beach Hotel, Chicago, Ill. Newbold C. Goin, executive secretary, Empire Bldg., Pittsburgh 22, Pa.

NOVEMBER 7-8—Tenth annual NATIONAL TIME AND MOTION STUDY CLINIC sponsored by the Industrial Management Society, at the Continental Hotel, Chicago, Ill.; the theme will be "Productivity Creates Wages." For further information, address the Society at 176 W. Adams St., Chicago 3, Ill.

NOVEMBER 7-8 — National Fuels and Lubricants Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Mayo Hotel, Tulsa, Okla. Secretary and general manager, John A. C. Warner, 29 W. 39th St., New York 18, N. Y.

NOVEMBER 17-22—Annual meeting of the AMERICAN WELDING SOCIETY at the Hotel Ambassador, Atlantic City, N. J., in conjunction with the National Metal Congress and Exposition. Secretary, M. M. Kelly, 33 W. 39th St., New York 18, N. Y.

NOVEMBER 18-22 — NATIONAL METAL CONGRESS AND EXPOSITION in Atlantic City, N. J., under the auspices of the American Society for Metals. For further information, address managing director, W. H. Eisenman, 7301 Euclid Ave., Cleveland 3, Ohio.

DECEMBER 2-4—National Air Transport Engineering Meeting of the SOCIETY OF AUTOMOTIVE ENGINEERS at the Edgewater Beach Hotel, Chicago, Ill. Secretary and general manager, John A. C. Warner, 29 W. 39th St., New York 18, N. Y.

DECEMBER 2-6—Annual meeting of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS in New York City. Clarence E. Davies, secretary, 29 W. 39th St., New York 18, N. Y.

DECEMBER 2-7—SEVENTEENTH NATIONAL POWER SHOW at Grand Central Palace, New York. Further information can be obtained from the manager, Charles F. Roth, Grand Central Palace, New York 17, N. Y.

DECEMBER 9-11—Annual meeting of the SOCIETY FOR EXPERIMENTAL STRESS ANALYSIS at the Hotel New Yorker, New York, N. Y. For further information, address the Society at P.O. Box 168, Cambridge 39, Mass.

JANUARY 23-26, 1947—Second conference and exhibit of the LOW-PRESSURE DIVISION OF THE SOCIETY OF THE PLASTICS INDUSTRY, INC., at the Edgewater Beach Hotel, Chicago, Ill. For further information, address the Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y.

FEBRUARY 24-28, 1947—Spring meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at the Benjamin Franklin Hotel, Philadelphia, Pa. Secretary, C. L. Warwick, 1916 Race St., Philadelphia 3, Pa.

APRIL 29-MAY 1, 1947 — INDUSTRIAL PACKAGING AND MATERIALS HANDLING EXPOSITION at Hotel Sherman, Chicago, Ill., sponsored by the Industrial Packaging Engineers' Association of America, 134 S. La Salle St., Chicago 3, Ill.

MAY 5-11, 1947 — NATIONAL PLASTICS EXPOSITION at the Coliseum, Chicago, Ill., under the auspices of the Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y.

JUNE 16-20, 1947—Annual meeting of the AMERICAN SOCIETY FOR TESTING MATERIALS at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary, C. L. Warwick, 1916 Race St., Philadelphia 3, Pa.

* * *

New Screw Machine Movie Produced by Greenlee

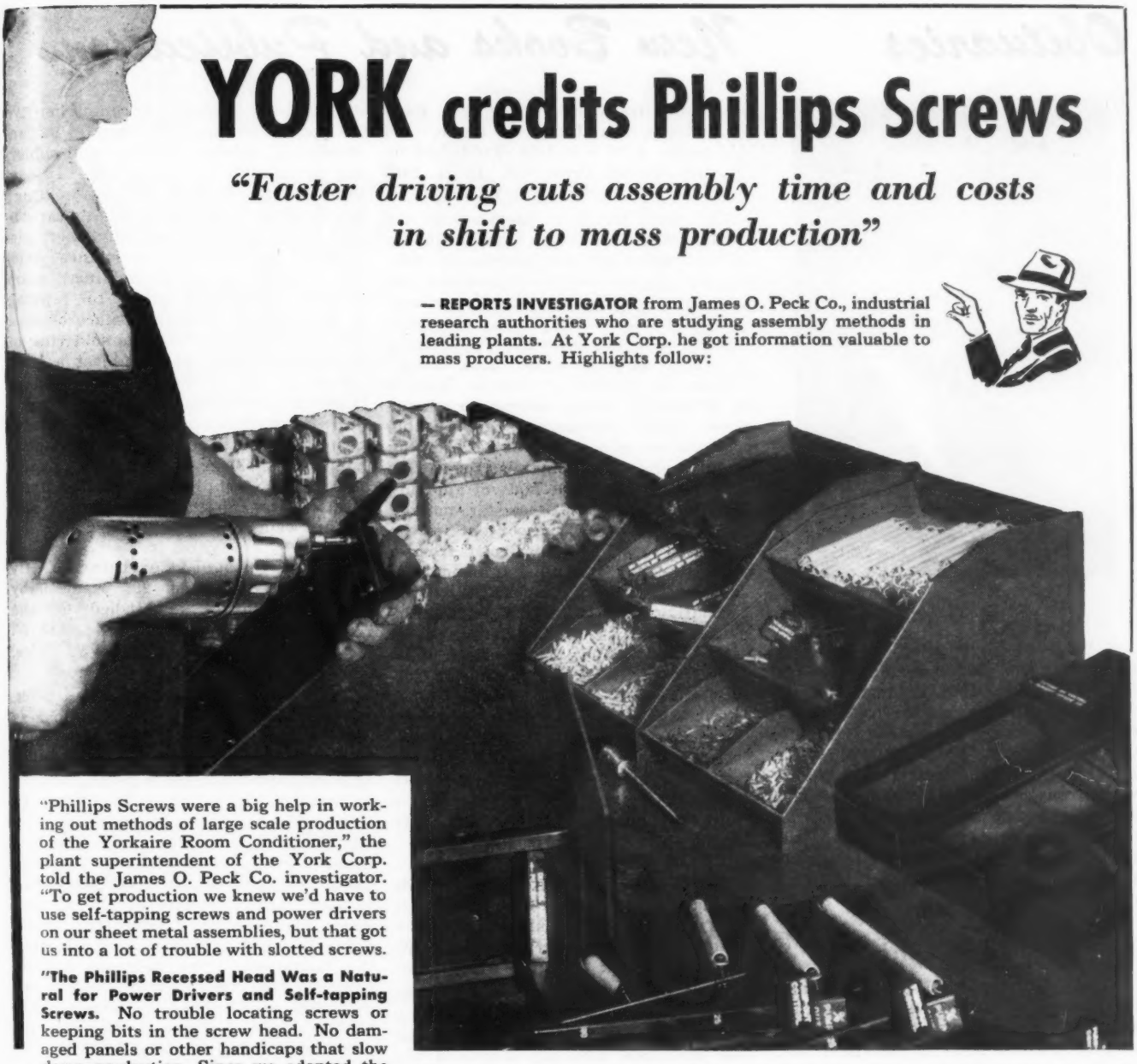
Greenlee Bros. & Co. have made available a forty-minute, 16-millimeter sound movie showing the construction and operating features of the Greenlee six-spindle automatic screw machine. The film serves as a practical training aid for Greenlee operators and set-up men, and gives the prospective user detailed information about the construction of the machine. It features the building of the machine from foundry to finished product. The design and function of hidden parts and mechanisms are exposed and specific attention is given to principles of operation and set-up.

The film can be obtained on a loan basis by writing Greenlee Bros. & Co., Rockford, Ill. Requests should state the length of time it will be necessary to retain the film.

YORK credits Phillips Screws

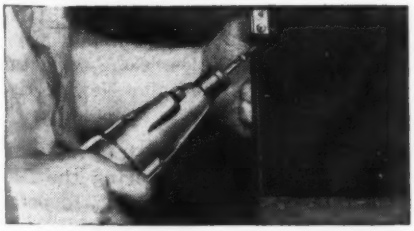
"Faster driving cuts assembly time and costs in shift to mass production"

— **REPORTS INVESTIGATOR** from James O. Peck Co., industrial research authorities who are studying assembly methods in leading plants. At York Corp. he got information valuable to mass producers. Highlights follow:



"Phillips Screws were a big help in working out methods of large scale production of the Yorkaire Room Conditioner," the plant superintendent of the York Corp. told the James O. Peck Co. investigator. "To get production we knew we'd have to use self-tapping screws and power drivers on our sheet metal assemblies, but that got us into a lot of trouble with slotted screws.

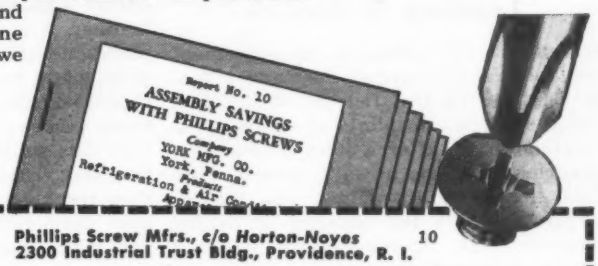
"The Phillips Recessed Head Was a Natural for Power Drivers and Self-tapping Screws. No trouble locating screws or keeping bits in the screw head. No damaged panels or other handicaps that slow down production. Since we adopted the Phillips Head in '37 it's been standard on all sheet metal assemblies.



"One-Hand Driving Is Easy With the Phillips 'Engineered Fit'. The precision recess snugs right onto the bit of the power driver and sticks there, making it so easy for the operator to center the screw in the hole that he can hold the work with one hand and drive with the other.

"Eliminated the Tremendous Amount of Screw Driver Slippage. Panels were no longer chewed up, a stop was put to turned or burred screw heads and the whole assembly line speeded up the moment we changed from slotted to Phillips Screws."

Important Information for You is available in the unabridged report by this independent investigator of the York Corporation's experience with Phillips Screws. *Other reports*, covering assembly practises in 9 prominent plants making products of metal, wood and plastics, are yours for the asking... FREE! Use the coupon NOW.



PHILLIPS *Recessed Head* SCREWS

Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

26 SOURCES

American Screw Co.
Atlantic Screw Works
Atlas Bolt & Screw Co.
Central Screw Co.
Chandler Products Corp.
Continental Screw Co.
Corbin Screw Div. of American Hdwe. Corp.
The H. M. Harper Co.
International Screw Co.
Lamson & Sessions Co.
Manufacturers Screw Products
Milford Rivet and Machine Co.
National Lock Co.
National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.
Pheoll Manufacturing Co.
Reading Screw Co.
Russell Burdsall & Ward Bolt & Nut Co.
Scovill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
Sterling Bolt Co.
Wolverine Bolt Company

Phillips Screw Mfrs., c/o Horton-Noyes 10
2300 Industrial Trust Bldg., Providence, R. I.

Send me reports on Assembly Savings with Phillips Screws.

Name.....

Company.....

Address.....

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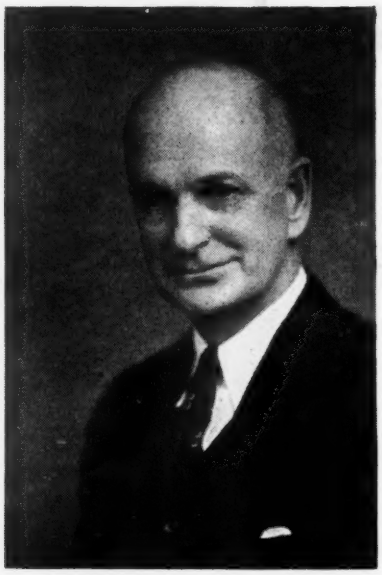
Obituaries



E. B. Gardner

E. B. Gardner, vice-president in charge of export sales for the Hanchett Mfg. Co., Big Rapids, Mich., died suddenly on August 14 following a heart attack. Mr. Gardner began his career with the Gardner Machine Co. of Beloit, Wis. Later he formed the Badger Tool Works, which was acquired by the Hanchett Mfg. Co. eighteen years ago. At that time, he became sales manager for the Hanchett organization, later being advanced to the position of vice-president in charge of export sales.

Stanley Motch

Stanley Motch, vice-president and treasurer of the Motch & Merryweather Machinery Co., Cleveland, Ohio, died on August 20 at his home in Cleveland. Mr. Motch was born in Covington, Ky., on February 23, 1877. He graduated from the Massachusetts Institute of Technology as a mining engineer. In 1904, he went to Cleveland, and with his brother, Edwin R. Motch, and the late George E. Merryweather organized the Motch & Merryweather Machinery Co.

Laurence S. Andrich

Laurence S. Andrich, vice-president and general manager of the Snyder Tool & Engineering Co., Detroit, Mich., died in the Ford Hospital at Detroit on September 10, after a long illness. Mr. Andrich was born in Galt, Ontario, Canada, in 1901. He joined the Snyder organization in the capacity of draftsman in 1928. Rising rapidly, he held many responsible positions, and for a number of years was vice-president in charge of sales and engineering. Previous to joining the Snyder company, he was associated with Oakland and Dodge in the capacity of tool engineer. Mr. Andrich was a member of the A.S.T.E.

New Books and Publications

MACHINE OPERATION TIMES FOR ESTIMATORS. By Joseph C. Derse. 156 pages, 6 by 9 inches. Published by the Ronald Press Co., 15 E. 26th St., New York 10, N. Y. Price, $6.

This book has been prepared by the author, who is division head in charge of estimating of the Airesearch Mfg. Co., for use not only by estimators, but also by production managers, methods engineers, time-study men, and others concerned in any way with procedures or times on jobs. The book avoids lengthy discussions of various theories of estimating, giving instead an informative, easily understood, and usable presentation of methods of determining machine and operation times for a wide range of work and methods of applying standard elemental times for making detailed estimates. The contents of the book will best be understood from a list of the chapter headings: Benefits of Detailed Estimating; Imposed Limits on Estimating with Standard Data; Element Breakdown Applicable to Turret Lathes and Screw Machines; Fundamental Steps in the Estimating of Turret Lathe and Screw Machine Jobs; Turret Lathe and Screw Machine Cases; Estimating Engine Lathe Operations; Estimating of Drill Press Operations; Estimating of Milling Operations; Estimating of Gear-cutting Operations; Production Grinding Estimating; and Estimating a Complete Part.

MATERIALS-HANDLING EQUIPMENT. By Matthew W. Potts. 172 pages, 5 1/2 by 8 inches. Published by the Pitman Publishing Corporation, 2 W. 45th St., New York 19. Price, $2.50.

In his introduction to this book, the author mentions that the problems encountered during the war in connection with materials handling disclosed the fact that no up-to-date text-books were available on this subject. To meet this need, the author prepared a series of articles, which, in expanded form, are now made available in this book. The book describes the application of a number of standard types of materials-handling equipment. It does not attempt to go into details of design, but covers applications in a comprehensive manner. Usual rather than unusual applications are described. An effort has been made to deal with principles and fundamentals, so that the book will serve those not thoroughly familiar with this subject. The main sections of the book treat of conveyors; elevators; shop trucks; hoisting machinery; trackless carriers; tractors and trailers; and miscellaneous equipment.

WELDING ALUMINUM AND ALUMINUM ALLOYS. 87 pages, 6 by 9 inches; profusely illustrated. Published by the Reynolds Metals Co., Department 47, 2500 S. 3rd St., Louisville 1, Ky. Price, $1.

This book contains a comprehensive review of the important items to be considered in welding, brazing, and soldering aluminum and its alloys. It contains special sections on gas welding; arc welding, including metal-arc, carbon-arc, atomic-hydrogen arc, and inert-gas-shielded arc welding; resistance welding, including spot welding, seam welding, and flash welding; the brazing of aluminum, including furnace brazing and torch brazing; and the soldering of aluminum. Under each subject a comprehensive treatment of the procedure is given. For example, in the gas welding section information on edge preparation, cleaning and preheating, welding flame, welding rods, welding fluxes, and welding technique is included. Data is also given on the inspection of aluminum welds.

HOW TO CONDUCT CONFERENCES. By Alfred M. Cooper. 207 pages, 5 by 7 1/4 inches. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Price, $2.

This is the second edition of a book, the original of which appeared just as we entered the war. During the war years, the methods of conference leadership in industry found wide application in industrial meetings of every type. In this revised edition, certain changes have been made in the text in order to bring the material up to date. The book contains chapters on: The Conference Leader; The Elements of the Conference; Planning the Conference; Developing Discussion Questions; Evaluating the Conference; The Business Conference; Selling by Conference Methods; Teaching by Conference Methods; Labor Relations Conference; Further Applications of the Conference; and The Finer Points of Conference Leadership.

MANUAL OF DESIGN FOR ARC-WELDED STEEL STRUCTURES. Compiled by LeMotte Grover. 300 pages. Published by Air Reduction Sales Co., Department MD, 60 E. 42nd St., New York 17, N. Y. Price, $2.

This book contains information on structural welding, covering the fundamentals of design, materials, inspection, estimating, and engineering control of welding and related operations. Although much of the information has been compiled especially for use in building construction, many of the design diagrams and fundamental principles can be applied to other types of welded steel construction.

STEEL RIVETS. Simplified Practice Recommendation of the National Bureau of Standards No. R221-46. 13 pages, 6 by 9 inches. Obtainable from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. Price, 5 cents.

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